

NASA Satellite Trace Gas Products for Air Quality Applications

ARSET Webinar: April, 2014

ARSET

Appled **R**emote **S**ensing **E**ducation and **T**raining

A project of NASA Applied Sciences



Focus: Three Remote Sensing Trace Gas Products

1. Tropospheric Column NO₂

- From OMI (Ozone Monitoring Instrument) on-board Aura satellite (<http://aura.gsfc.nasa.gov>)

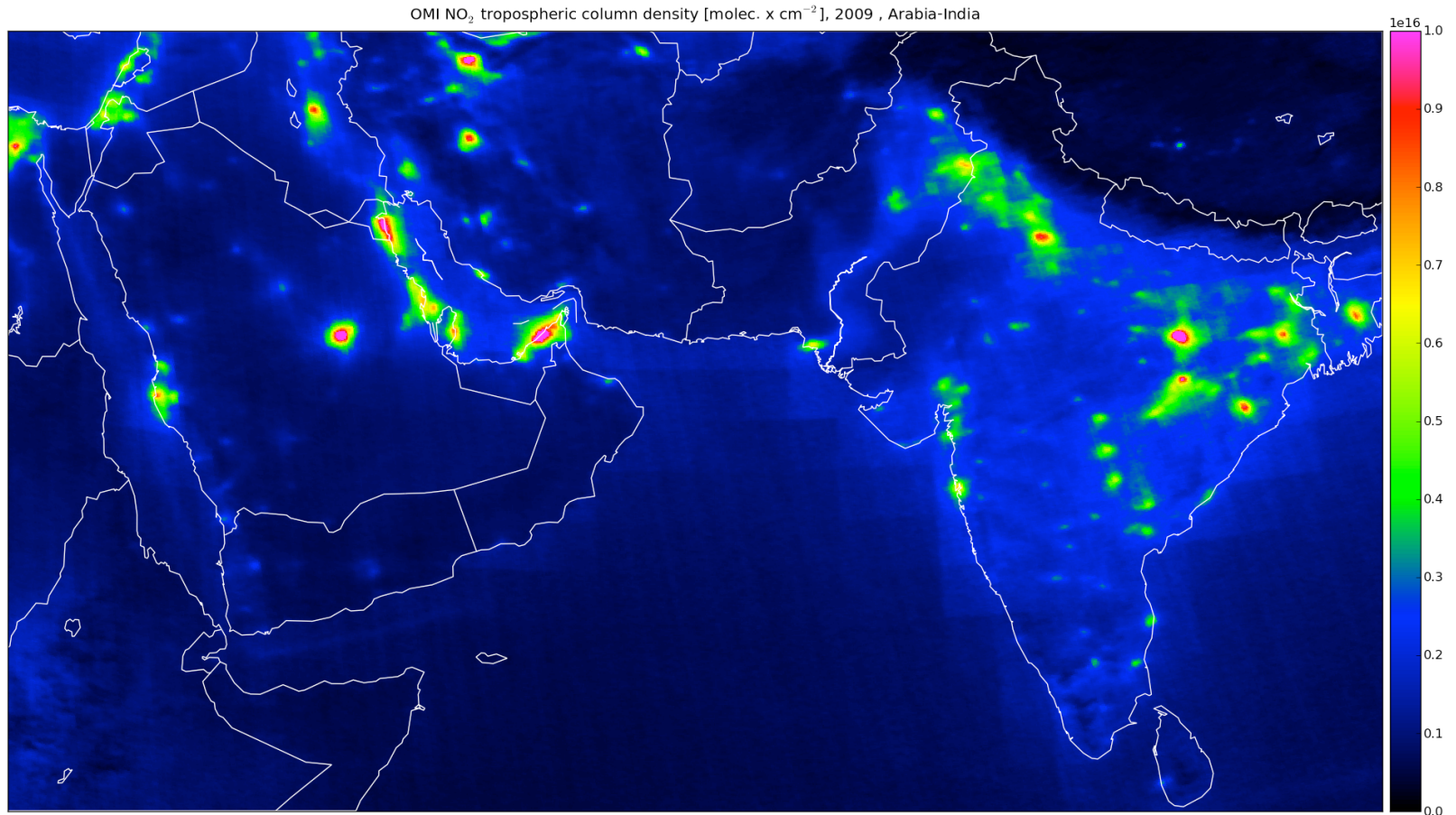
2. Boundary Layer SO₂

- From Aura OMI

3. Total Column and profile measurements of CO

- From MOPITT (Measurements of Pollution in the Troposphere) on-board the Terra satellite (<http://www2.acd.ucar.edu/mopitt>)

Aura/OMI NO₂



OMI-derived tropospheric NO₂ columns track NO₂ pollution near the surface, which is an important precursor of urban smog.

Level 1 – Raw

Level 2 – Orbit

Level 3 - Gridded

**Highest Resolution,
Difficult**

**Lower Resolution,
Easy**



OMI Tropospheric Column NO₂ for AQ appl.

- Two *Separate* Algorithms

1. NASA/GSFC “Standard Product”

- Level 3 data 0.25x0.25 degree gridded
- Data Short name = OMNO2d

2. KNMI (Royal Netherlands Meteorological Institute) DOMINO (Near-Real Time) Product

- Level 2 data and images available from KNMI and TEMIS.
- Data Short Name = OMDOMINO
- <http://www.temis.nl/airpollution/no2.html>
- Includes data/images from European Satellite instruments: GOME, GOME-2, SCIAMACHY

GSFC Standard Product for AQ Applications

Data Set Short Name = OMNO2d

Product Level = 3

Begin Date = October 1, 2004

Resolution = $0.25^\circ\text{lon} \times 0.25^\circ\text{lat}$

Version = 003

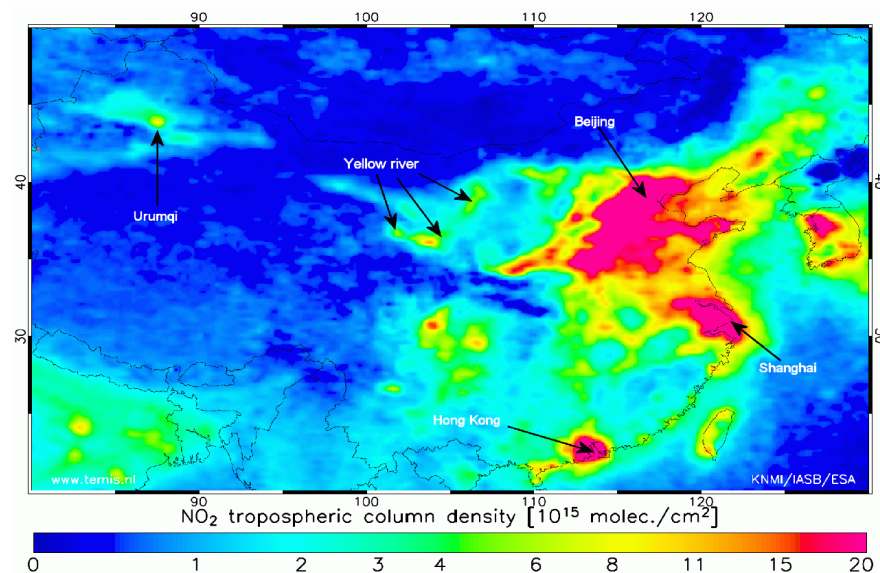
Cloud-screened best observation

Production Frequency: Daily

Granule (File) Coverage: 15 orbits

File Size (Approx): 2.5 MB

Data Format = HDF (hierarchical data format)



Data are publicly available here:

http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omno2d_v003.shtml

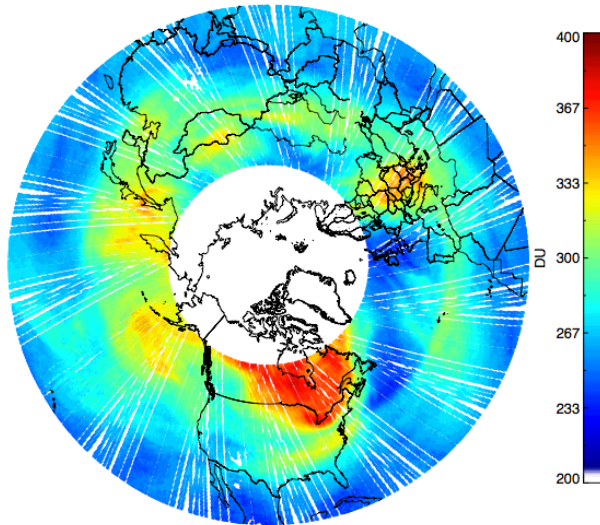


Important information regarding OMI

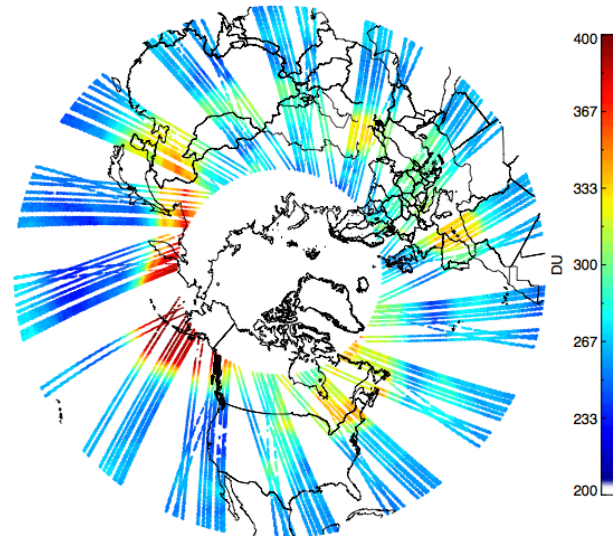
Almost 50% data loss since 2008
(row anomaly effect)

Affects O_3 , SO_2 , and to some extent NO_2 OMI Products

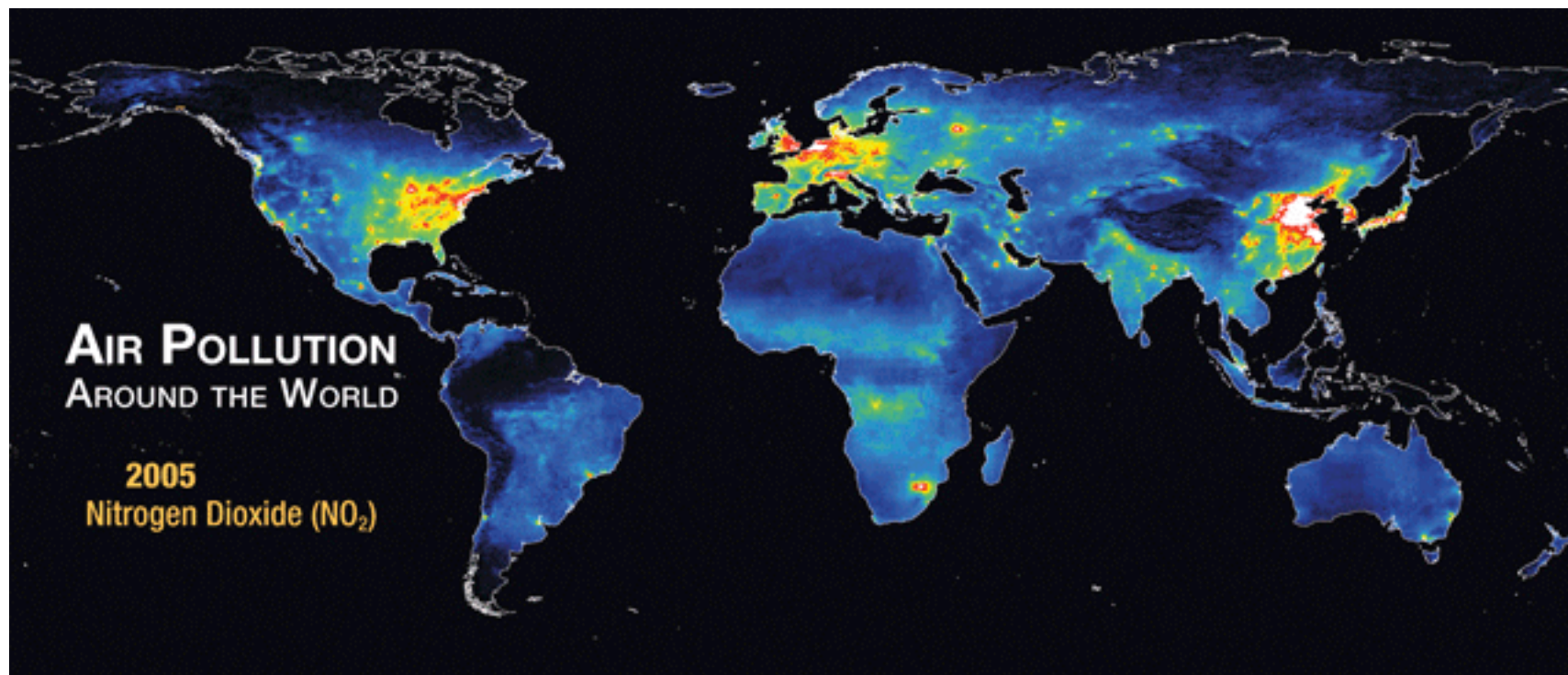
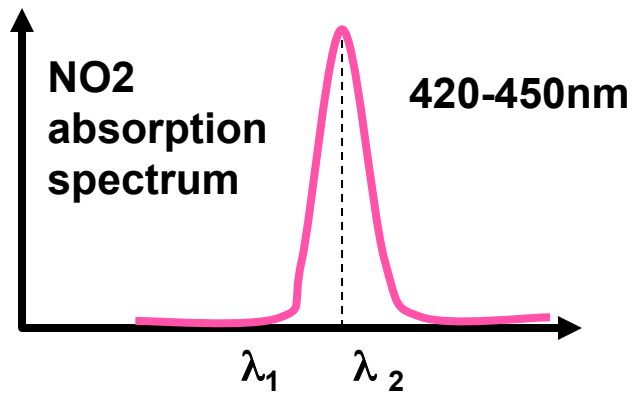
OMI TO3 L2G: 2006 11 3



OMI TO3 L2G: 2010 11 1



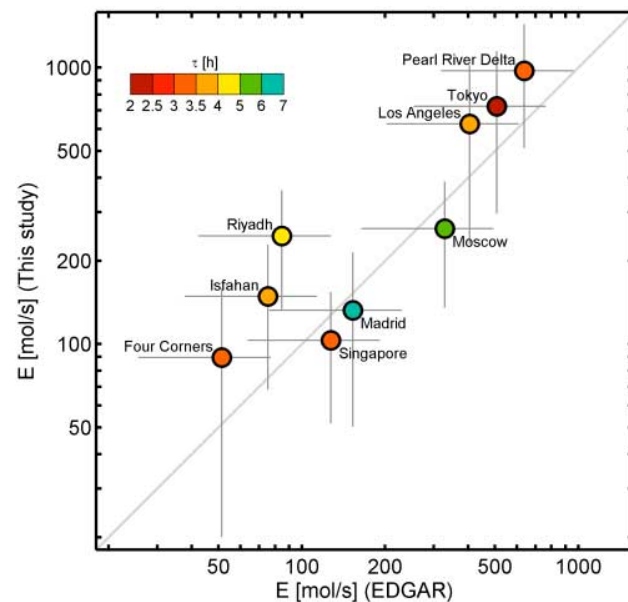
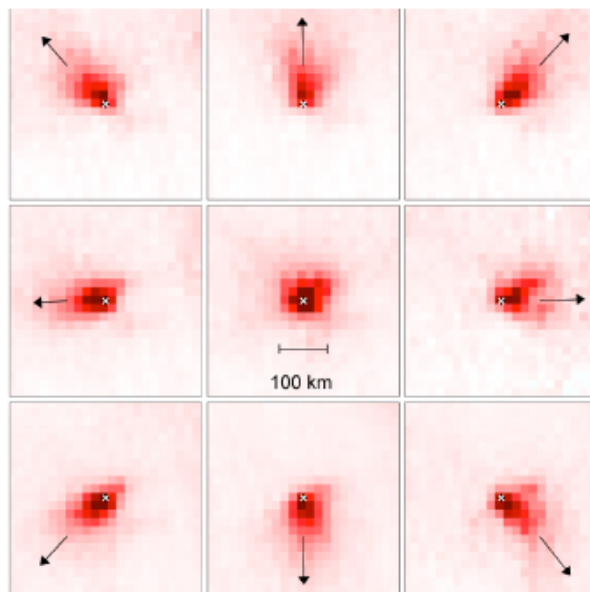
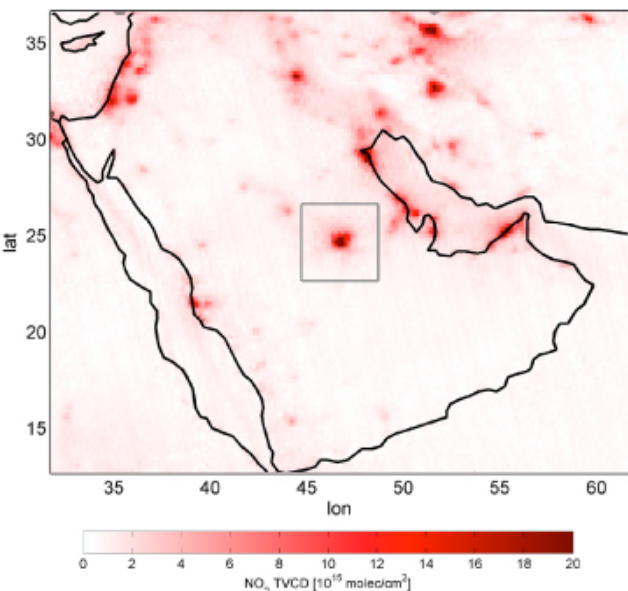
Examples of OMI NO₂ Applications



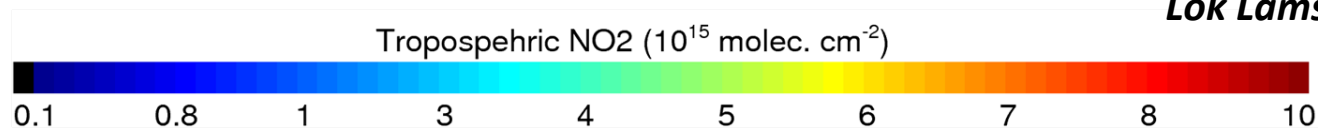
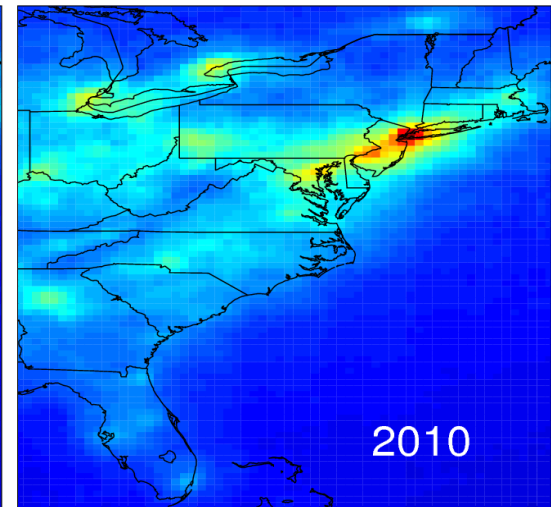
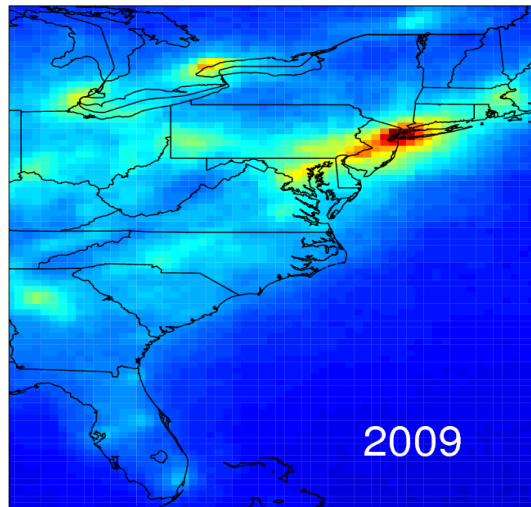
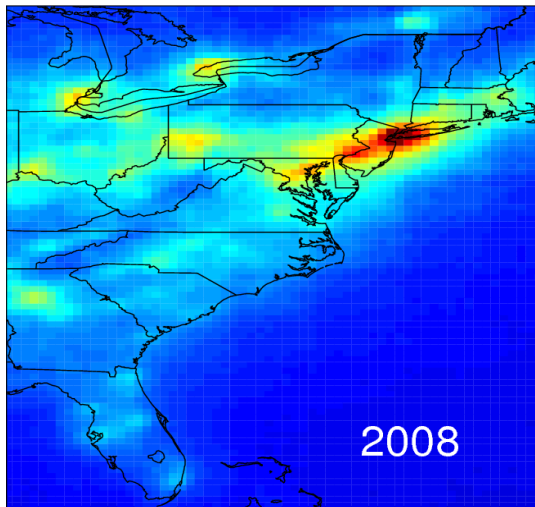
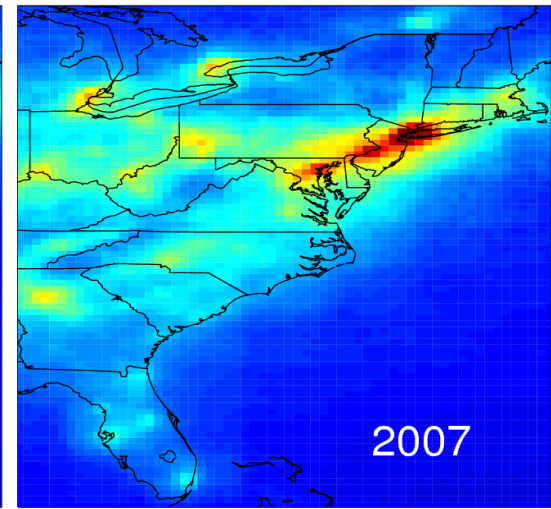
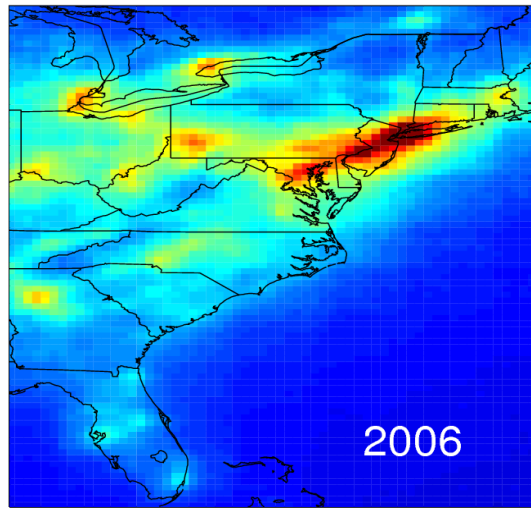
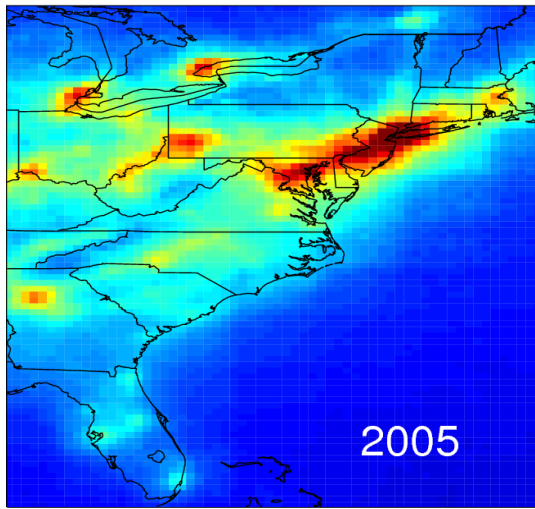


OMI DOMINO Product: Level 2 only

Direct observations of megacity emissions and lifetimes of nitrogen oxides



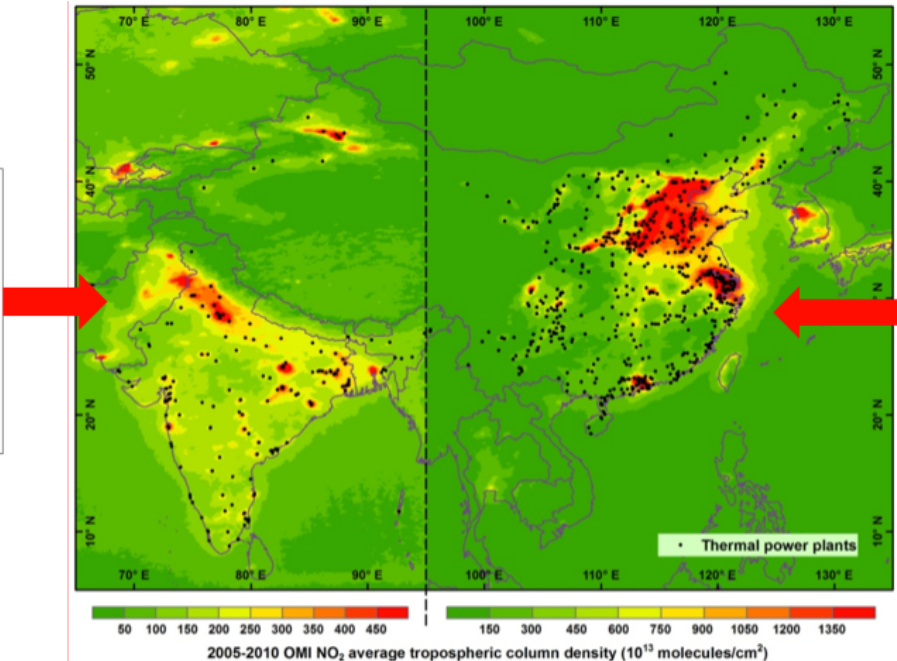
OMNO₂ Standard Product shows declining trends over the Eastern US ~10%/year



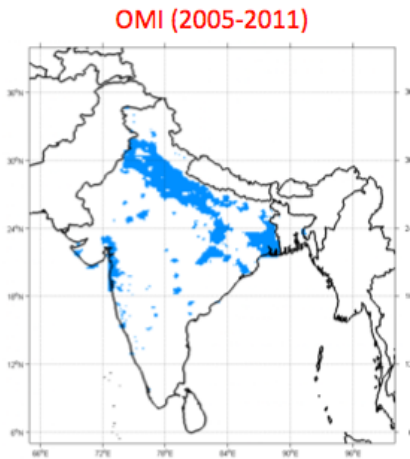
Lok Lamsal, 2012

Uses OMI NO₂ tropospheric columns to constrain models to identify NO_x emission sources.

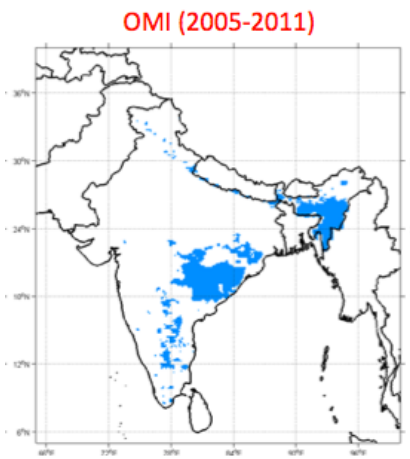
STEM-
modeled
NO₂ columns
*[new
collaboration
with Greg C]*



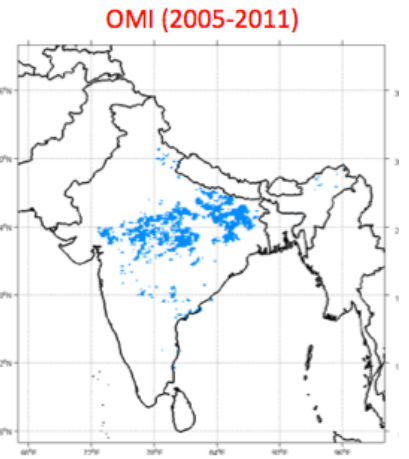
GEOS-Chem
modeled NO₂
columns *[Wang
et al., 2012]*



Dominant anthropogenic
source regions



Biomass burning regions



Soil emission regions

OMI NO₂ Data Access

GES-DISC (Goddard Earth Science Data and Information Services Center)

- http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omno2d_v003.shtml
- Level 2, L2G, Level 3 (OMNO2d)
- HDF and NetCDF
- Documentation

AVDC (Aura Validation Data Center)

- <http://avdc.gsfc.nasa.gov>
- Level 3 (OMNO2d)
- HDF, ASCII, KML formats
- Daily and monthly data and Images

GIOVANNI – an interactive visualization tool

- <http://disc.sci.gsfc.nasa.gov/giovanni>
- L2G, Level 3 (OMNO2d)
- HDF, ASCII, KML for Google Earth
- Subsetting available



GES DISC Home

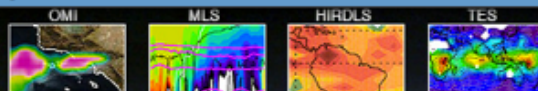
Data Services

Science Portals

Mission Portals

A-Train AIRS Aura Modeling MEaSUREs **SORCE** TRMM More...

AURA



DATA HOLDINGS

- Access
- OMI
- MLS
- HIRDLS
- TES

Additional Features

- Documentation
- Tools
- Links
- FAQ
- News

You are here: [GES DISC Home](#) » [Aura](#) » [Data Holdings](#) » [OMI](#) » Aura OMI Level-3 Global Gridded Total and Tropospheric NO₂ Data Product (0.25x0.25 deg): OMNO2d

Aura OMI Level-3 Global Gridded Total and Tropospheric NO₂ Data Product (0.25x0.25 deg): OMNO2d

OMI Level-3 Global Gridded NO₂ data product, [OMNO2d](#), is now available from GES DISC (Release Date: Jan 10, 2013). OMNO2d data product provides the average of all good quality data in 0.25x0.25 degree global grids.

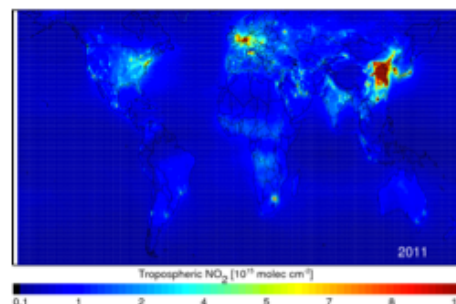
Note:

In the past, only one OMI Level-3 NO₂ data product, OMNO2e, was released which contained the "average" value of all Level-2 "Good" pixels in each 0.25x0.25 deg global Level-3 grid. Recently (Jan, 2013) OMNO2e product has been replaced by new Level-3 product "OMNO2d" which is based on revised NO₂ algorithm. The old OMNO2e data is no longer distributed from GES DISC. In the future, in addition to OMNO2d data, new OMNO2e product will be produced which will have only one "best" observation selected from the good quality pixels that occupy the 0.25x0.25 deg grid.

Data Access

- [Mirador - fast search & download](#)

Tropospheric Column Density of Nitrogen Dioxide, 2011



(P.I: Nickolay Krotkov, USA ; Pepijn Veefkind, KNMI)

Data Version and Data Holdings

Version	Begin Date	End Date
003	Oct 1, 2004	Current

Production Frequency: one file/day

Granule (File) Coverage: global

File Siz (max):: ~ 6 MB

Platform: EOS-Aura

Instrument: OMI

Product: Level-3 OMI NO₂ Cloud-Screened Total and Tropospheric Column NO₂ (V003)

Data Set Short Name: OMNO2d

Data Set Long Name: OMI/Aura NO₂ Cloud-Screened Total and Tropospheric Column Daily L3 Global 0.25deg Lat/Lon Grid (V003)

OMI Data Documents

- [Readme Document for OMNO2d](#)
- [File Format Spec.](#)
- [Data Read Software & Tools](#)
- [Giovanni: Data Exploration Interface](#)
- [OMI Data User's Guide](#)
- [Algorithm Theoretical Basis Document](#)

Other Related Documents:

- [OMNO2 data document for Global Change Master Directory](#)
- [HDF-EOS Aura File Format Guidelines](#)


Other Links :

- [EOS-Aura OMI Page](#)
- [OMI Home Page \(KNMI-Netherlands\)](#)
- [OMI/TOMS Home Page \(GSFC-NASA\)](#)
- [Aura Validation Data Center \(AVDC\)](#)

NASA GES-DISC – OMNO2d, Level 3, 0.25 Degree Product

http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omno2d_v003.shtml

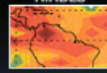
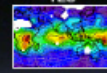
[NASA Earth Data](#) [Data Discovery](#) [Data Centers](#) [Community](#) [Science Disciplines](#) [Search EOSDIS](#)

 **GES DISC** Goddard Earth Sciences Data and Information Services Center

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[A-Train](#) [AIRS](#) [Aura](#) [Modeling](#) [MEaSUREs](#) [SORCE](#) [TRMM](#) [More...](#)

AURA

DATA HOLDINGS

- Access
- OMI**
- MLS
- HIRDLS
- TES

Additional Features

- Documentation
- Tools
- Links
- FAQ
- News

You are here: [GES DISC Home](#) » [Aura](#) » [Data Holdings](#) » [OMI](#) » Aura OMI Level-3 Global Gridded Total and Tropospheric NO₂ Data Product (0.25x0.25 deg): OMNO2d

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Data Access

- Mirador - fast search & download**

Platform: EOS-Aura

Instrument: OMI

Product: Level-3 OMI NO₂ Cloud-Screened Total and Tropospheric Column NO₂ (V003)

Data Set Short Name: OMNO2d

Data Set Long Name: OMI/Aura NO₂ Cloud-Screened Total and Tropospheric Column Daily L3 Global 0.25deg Lat/Lon Grid (V003)

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- [Algorithm Theoretical Basis Document](#)

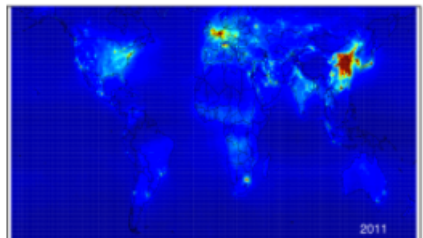
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- [OMNO2 data document for Global Change Master Directory](#)
- [HDF-EOS Aura File Format Guidelines](#)

Data Version and Data Holdings

Version	Begin Date	End Date
003	Oct 1, 2004	Current

Tropospheric Column Density of Nitrogen Dioxide, 2011



(P.I: Nickolay Krotkov, USA ; Pepijn Veefkind, KNMI)

Mirador 1.47

Data Access Made Simple

Keyword: ?

OMNO2d

Time Span ?

From: 2013-01-09

To: 2013-01-12 23:59:59

Location: ?

(-90,-180),(90,180)

Update Map

Coverage Map >>

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You are here: [KeywordSearch](#) >> [Data sets from OMNO2d search](#) >> File Listing >> Service Selection >> Your Cart >> Checkout

Keyword

Projects

Science Areas

Data Sets

Results 1 - 1 of 1 for OMNO2d (1 seconds)

-More Services (e.g. http download, format conversion, subsets etc) are available for the data set(s). Whenever you add files to the shopping cart, you will be presented with options for selecting a service and service parameters for any data set which has these services.

☐ **OMI/Aura NO2 Cloud-Screened Total and Tropospheric Column Daily L3 Global 0.25deg Lat/Lon Grid (OMNO2d)**[View Files](#) | [Info](#) | [Giovanni Analysis](#) | [Data Calendar](#)

Approx. 5 files found (Avg Size: 9.912 MB)

Parameters: CLOUD-SCREENED TOTAL COLUMN NO2, CLOUD-SCREENED TROPOSPHERE COLUMN NITROGEN DIOXIDE

Spatial Resolution: 0.25 degrees x 0.25 degrees

Temporal Resolution: 1 Day

Keyword

Projects

Science Areas

Results 1 - 4 for OMNO2d (2 seconds)

OMI/Aura NO2 Cloud-Screened Total and Tropospheric Column Daily L3 Global 0.25deg Lat/Lon Grid **Info**

The following services are available for the data set(s). Whenever you add files to the shopping cart, you will be presented with options for selecting these services.

[Download via HTTP](#) [Convert to NetCDF](#)

<input checked="" type="checkbox"/> Select All in Page <input type="checkbox"/> File Names/Descriptive File Names	Start Time
<input checked="" type="checkbox"/> OMI-Aura L3-OMNO2d 2013m0112 v003-2013m0222t063248.he5 (8.64 MB) One Click Download: HDFEOS5 (FTP) HDFEOS5 (HTTP) NetCDF OPeNDAP	2013-01-12 00:00:00 (Day) Metadata
<input checked="" type="checkbox"/> OMI-Aura L3-OMNO2d 2013m0111 v003-2013m0222t153422.he5 (4.02 MB) One Click Download: HDFEOS5 (FTP) HDFEOS5 (HTTP) NetCDF OPeNDAP	2013-01-11 00:00:00 (Day) Metadata
<input checked="" type="checkbox"/> OMI-Aura L3-OMNO2d 2013m0110 v003-2013m0222t063217.he5 (6.28 MB) One Click Download: HDFEOS5 (FTP) HDFEOS5 (HTTP) NetCDF OPeNDAP	2013-01-10 00:00:00 (Day) Metadata
<input checked="" type="checkbox"/> OMI-Aura L3-OMNO2d 2013m0109 v003-2013m0222t063247.he5 (8.79 MB) One Click Download: HDFEOS5 (FTP) HDFEOS5 (HTTP) NetCDF OPeNDAP	2013-01-09 00:00:00 (Day) Metadata

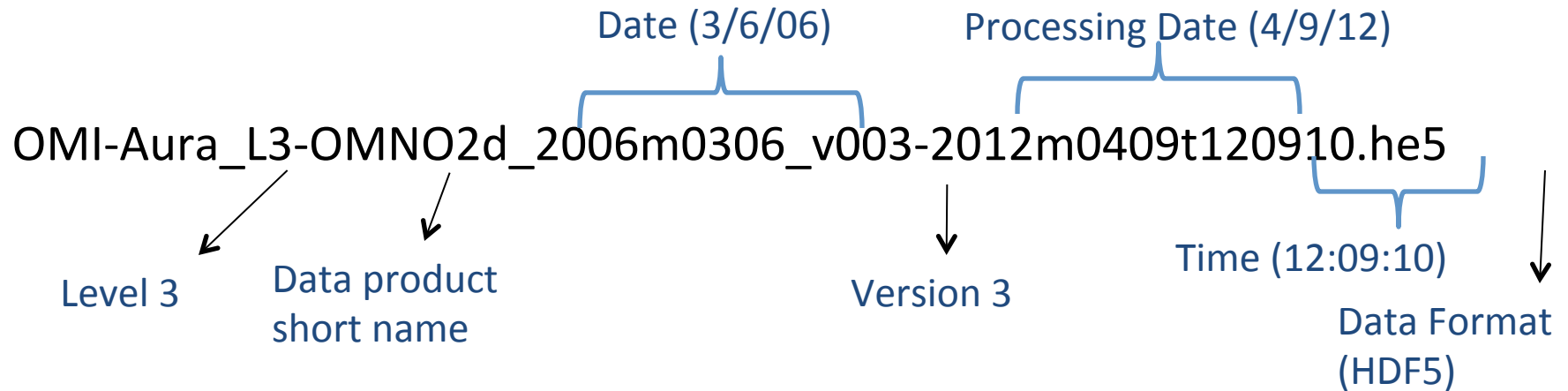
Add Selected Files To Cart

Add All Files in All Pages To Cart

File Name Convention

OMI-Aura_L3-OMNO2d_2006m0306_v003-2012m0409t120910.he5

Level 3 Data product short name Date (3/6/06) Version 3 Processing Date (4/9/12) Time (12:09:10) Data Format (HDF5)



The diagram illustrates the file name convention for OMI-Aura data. The file name is OMI-Aura_L3-OMNO2d_2006m0306_v003-2012m0409t120910.he5. Annotations with arrows point to specific parts of the file name: 'Level 3' points to 'L3', 'Data product short name' points to 'OMNO2d', 'Date (3/6/06)' points to '2006m0306', 'Version 3' points to 'v003', 'Processing Date (4/9/12)' points to '2012m0409', 'Time (12:09:10)' points to 't120910', and 'Data Format (HDF5)' points to '.he5'. Blue brackets are used to group the date and version components, and the processing date and time components.

OMI NO₂ Data Access

GES-DISC (Goddard Earth Science Data and Information Services Center)

- http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omno2d_v003.shtml
- Level 2, L2G, Level 3 (OMNO2d)
- HDF and NetCDF
- Documentation

AVDC (Aura Validation Data Center)

- <http://avdc.gsfc.nasa.gov>
- Level 3 (OMNO2d)
- HDF, ASCII, KML formats
- Daily and monthly data and Images

GIOVANNI – an interactive visualization tool

- <http://disc.sci.gsfc.nasa.gov/giovanni>
- L2G, Level 3 (OMNO2d)
- HDF, ASCII, KML for Google Earth
- Subsetting available





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<http://avdc.gsfc.nasa.gov>

The AVDC

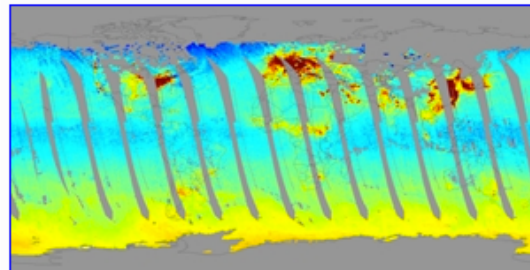
The Aura Validation Data Center (AVDC) is a centralized, long-term, archive for validation data hosted by the Atmospheric Chemistry and Dynamics Branch at the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. The AVDC mission is to support the Earth Observing System (EOS)-Aura validation and science activities, and the future "A-Train" Earth Science satellites validation activities.

Data archived at the AVDC originates from several special Aura validation campaigns, NASA aircraft and balloon deployments, established measurement networks for collection atmospheric data, the Network for Detection of Atmospheric Composition Change (NDACC), the Southern Hemisphere Additional Ozonesondes (SHADOZ), and the World Meteorological Organization (WMO)'s Global Atmosphere Watch (GAW), among others.

Latest Images

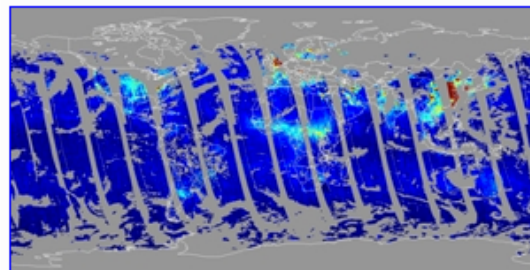
January 21, 2014

Total NO₂ vertical column densities (VCD)



January 21, 2014

Tropospheric NO₂ CS30 vertical column densities (VCD)



[more data](#)

Latest News

- Nov 08, 2013 - Reprocessed OMI L2 overpass files for orbit 49334-49511 (49327-49518 for OMNO2) due to the receipt of the missing NISE files beginning on 10/24/13.

- Nov 01, 2013 - Reprocessed OMUVB L2 station overpass files due to a bug found in the aerosol correction of OMUVB L2 version 1.3 [\[>\]](#)

- Oct 25, 2013 - Reprocessed OMI L2 overpass files for orbit 49101-49253 (49094-49260 for OMNO2) due to the delayed receipt of NISE during the shutdown.

Quick Links

- [AVDC public data access](#) [\[>\]](#)
- [GEOMS data upload](#) [\[>\]](#)
- [GEOMS overview](#) [\[>\]](#)
- [OMNO2 L3 data access](#) [\[>\]](#)
- [OMNO2 L3 gallery](#) [\[>\]](#)

Summary of Version 1.3 (S. T.)





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The global nitrogen dioxide (NO₂) measured by the Ozone Monitoring Instrument (OMI) on board the EOS-AURA satellite is available as a [mapped 0.05 deg x 0.05 deg product](#). Here we present yearly average data and differences of yearly average data for selected target regions, North America, Europe, Arabia, India and East Asia mapped on 0.05 deg x 0.05 deg.

OMI tropospheric NO₂ yearly average 2009

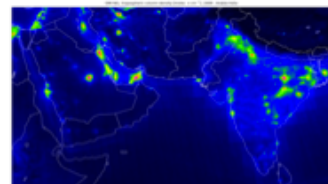
North America



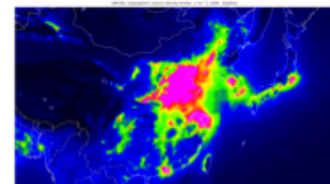
Europe



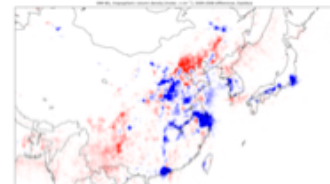
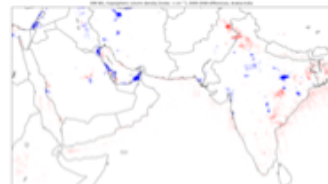
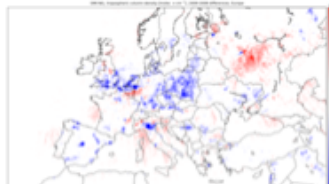
Arabia and India



East Asia

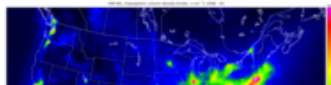


OMI tropospheric NO₂ yearly average differences 2009-2008

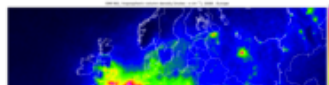


OMI tropospheric NO₂ yearly average 2008

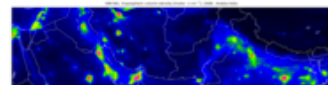
North America



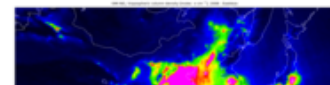
Europe



Arabia and India



East Asia



AVDC - Aura Validation Data Center

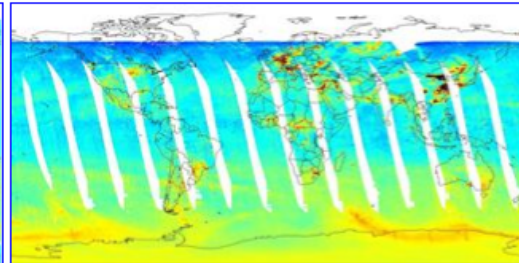
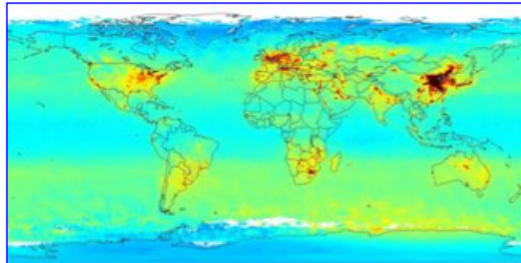
<http://avdc.gsfc.nasa.gov/index.php?site=705441739>

Total NO₂ vertical column densities (VCD)

Latest images:

October 2011

November 28, 2011



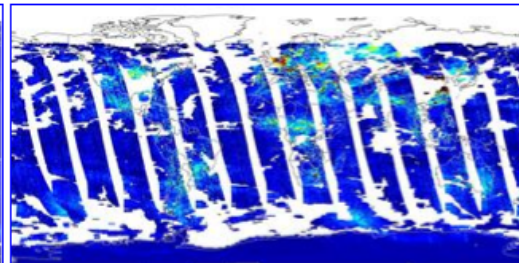
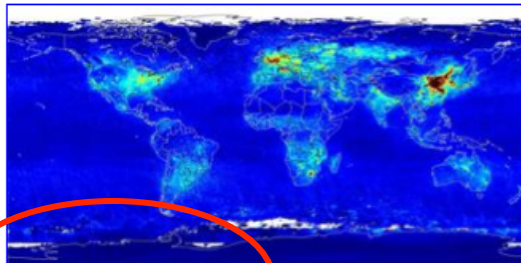
[to monthly/daily data](#)

Tropospheric NO₂ CS30 vertical column densities (VCD)

Latest images:

October 2011

November 28, 2011



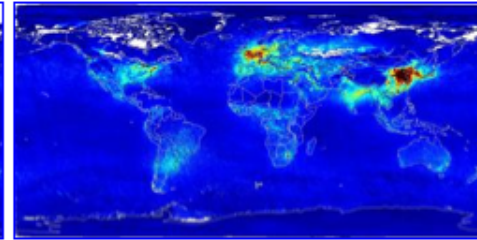
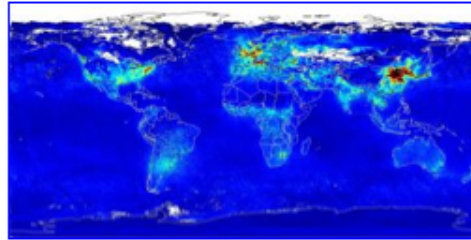
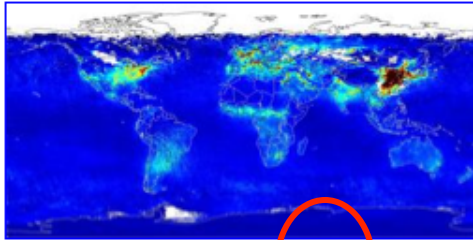
[to monthly/daily data](#)

CLICK

January

February

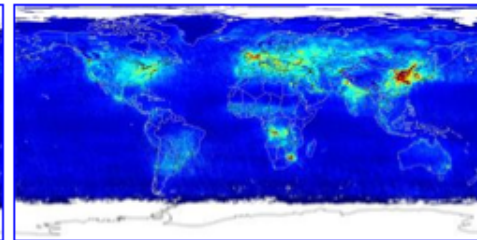
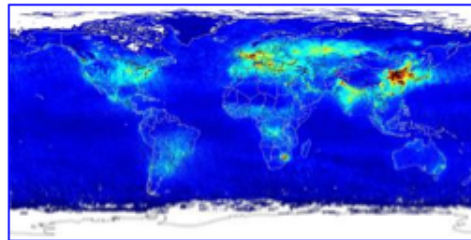
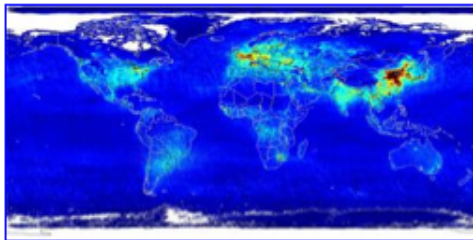
March



April

May

June



Daily Calendar

ASCII – filename “2011_04_NO2TropCS30.txt”

HDF5 – filename “2011_04_NO2TropCS30.hdf5”

KML – filename “EOS-Aura-OMI-OMNO2-L3_2011_01_NO2TropCS30.kml”

Tropospheric NO2 CS30 vertical column densities (VCD)

← → July 2011

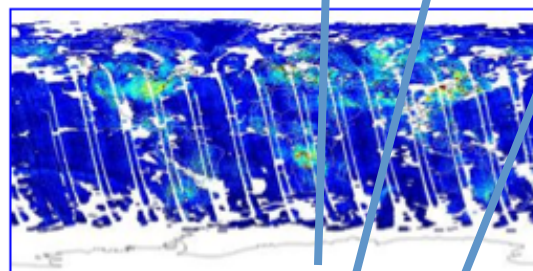
to monthly/daily data

Total Column Ozone in ASCII = "L3e_ozone_omi_20110401.txt"

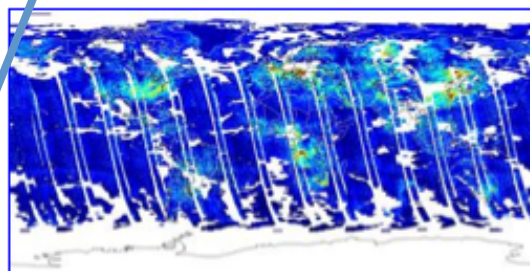
Reflectivity in ASCII = "L3e_refl_omi_20110403.txt"

Aerosol Index in ASCII = "L3e_aersl_omi_20110402.txt"

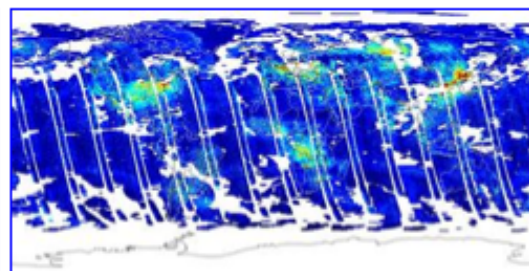
2011/07/01



2011/07/02



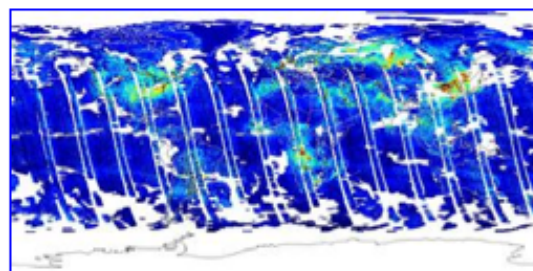
2011/07/03



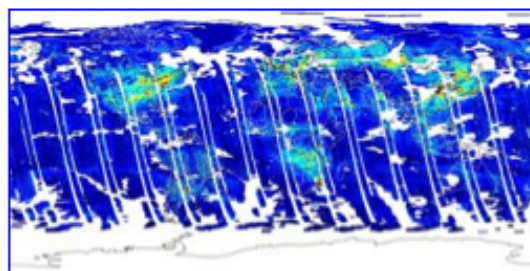
HDF file format

ASCII format

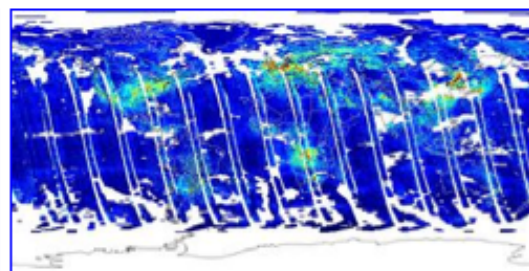
2011/07/04



2011/07/05

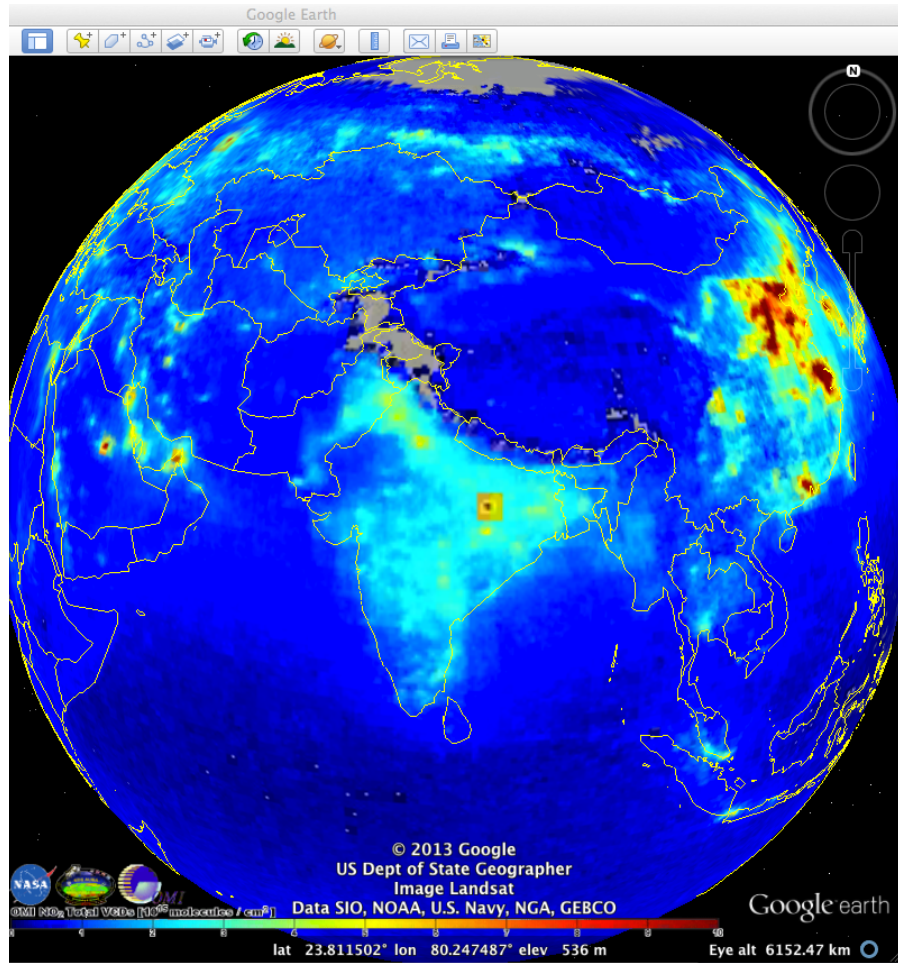


2011/07/06

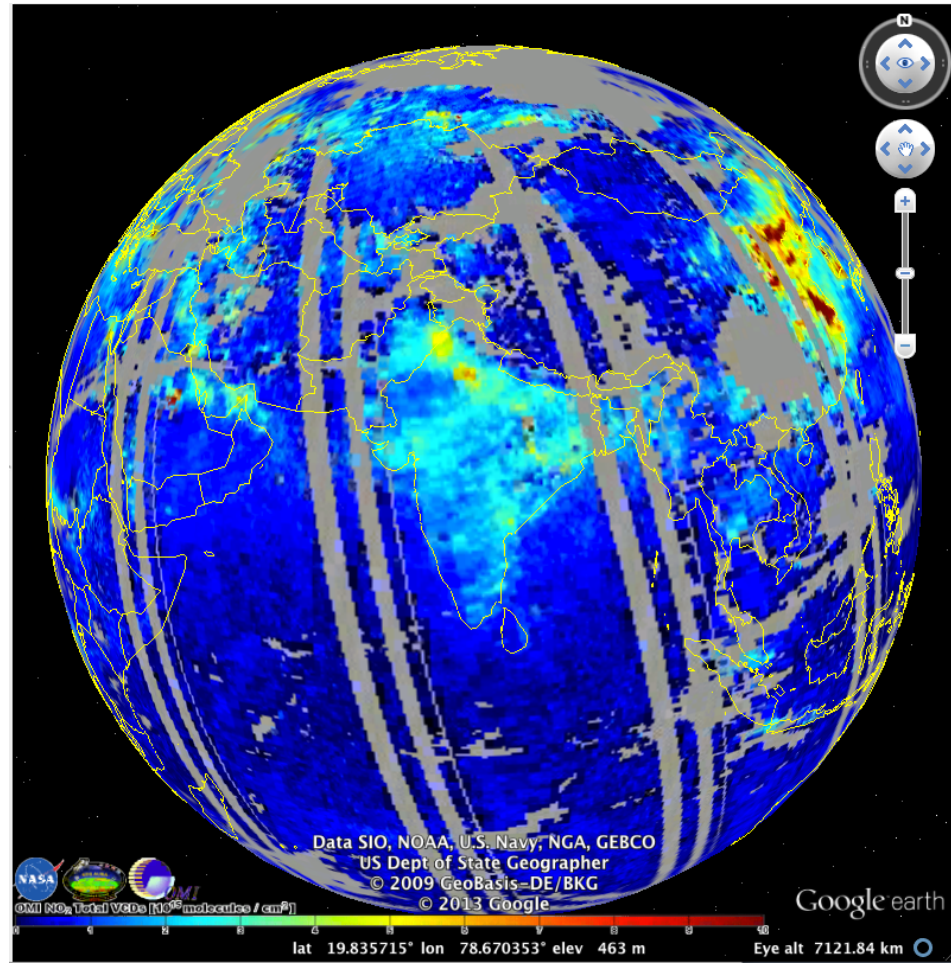


Google Earth image of OMI Tropospheric NO₂ for

May 2009



6 – May 2009



OMI NO₂ Data Access

GES-DISC (Goddard Earth Science Data and Information Services Center)

- http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omno2d_v003.shtml
- Level 2, L2G, Level 3 (OMNO2d)
- HDF and NetCDF
- Documentation

AVDC (Aura Validation Data Center)

- <http://avdc.gsfc.nasa.gov>
- Level 3 (OMNO2d)
- HDF, ASCII, KML formats
- Daily and monthly data and Images

GIOVANNI – an interactive visualization tool

- <http://disc.sci.gsfc.nasa.gov/giovanni>
- L2G, Level 3 (OMNO2d)
- HDF, ASCII, KML for Google Earth
- Subsetting available



Back Forward Print Home Reload Stop

disc.sci.gsfc.nasa.gov/giovanni

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Analyze Data with Giovanni Search for Data with Mirador Simple Subset Wizard Data Cookbook More...

Giovanni - The Bridge Between Data and Science

» OVERVIEW

- + What is Giovanni?
- + Who Uses Giovanni?
- + Giovanni Parameters
- + Giovanni Plot Types
- + How to Use Giovanni
- + How to Acknowledge Giovanni
- + Acknowledgements

Additional Features

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- + Users Manual
- + Publications
- + Newsletters
- + Feedback
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You are here: [GES DISC Home](#) » Giovanni - Interactive Visualization and Analysis

Giovanni - Interactive Visualization and Analysis

Contributors: tonyr, rchowdhury

Giovanni - Interactive Visualization and Analysis - GES DISC: Goddard Earth Sciences, Data and Information Services Center

Giovanni-4 Now Available
New! Please try out [Giovanni-4, the next generation of Giovanni](#), with dramatically improved performance and interactive plotting and mapping. (Currently, only select Aerosols, Hydrology and Turbulent Flux data are available in Giovanni-4, with more on the way.)

Giovanni Portals **Giovanni Parameter List**

Atmospheric Portals (Scroll down to view complete list)

- [Terra and Aqua MODIS: Daily](#)
- [Aura OMI Level 3](#)
- [Aura Microwave Limb Sounder \(MLS\)](#)
- [Aura High Resolution Dynamics Limb Sounder \(HIRDLS\)](#)
- [Aura Tropospheric Emission Spectrometer \(TES\)](#)

http://gdata1.sci.gsfc.nasa.gov/daac-bin/G3/gui.cgi?instance_id=omi

Antarctica

Antarctica

Area of Interest: West: -180 North: 90 South: -90 East: 180

Update Map

OMI Aerosol Wavelength

Select a wavelength value from the pulldown list. **This option is only enabled if a parameter from the OMAEROe product is selected!** Otherwise this option is greyed-out and not available.

Wavelength

NOTE: Selected 3D parameters **must** have the same 3rd dimension (e.g., pressure, altitude, wavelength, etc.) units in order to enable the vertical level menu.

Parameters

Display:

☒ Data Product Info

☒ Units

☐ Parameters with > 2 Dimensions

Daily 0.25 x 0.25 Degree Grid

☐ OMAEROe(2004/10/01 - 2014/01/21)

Parameter

Parameter Units

Data Product Info

☐ Absorbing Aerosol Optical Thickness

unitless

OMAEROe.003

Aura OMI

2004/10/01 - 2014/01/21

☐ Aerosol Optical Thickness

unitless

OMAEROe.003

Aura OMI

2004/10/01 - 2014/01/21

☐ Aerosol Single Scattering Albedo

unitless

OMAEROe.003

Aura OMI

2004/10/01 - 2014/01/21

☐ OMDOAO3e(2004/10/01 - 2014/01/21)

Parameter

Parameter Units

Data Product Info

☐ Column Amount Ozone

DU

OMDOAO3e.003

Aura OMI

2004/10/01 - 2014/01/21

☐ OMT03e(2004/10/01 - 2014/01/21)

Parameter

Parameter Units

Data Product Info

☐ Column Amount Ozone

DU

OMT03e.003

Aura OMI

2004/10/01 - 2014/01/21

☐ Radiative Cloud Fraction

unitless

OMT03e.003

Aura OMI

2004/10/01 - 2014/01/21

☐ OMSO2e(2004/10/01 - 2014/01/21)

Parameter

Parameter Units

Data Product Info

☐ Vertical Column Amount SO2 (PBL)

DU

OMSO2e.003

Aura OMI

2004/10/01 - 2014/01/21

☐ OMNO2d(2004/10/01 - 2014/01/21)

Parameter

Parameter Units

Data Product Info

☐ NO2 Total Column Amount

10^15 molec/cm^2

OMNO2d.003

Aura OMI

2004/10/01 - 2014/01/21

☐ NO2 Total Column Amount (Cloud-Screened at 30%)

10^15 molec/cm^2

OMNO2d.003

Aura OMI

2004/10/01 - 2014/01/21

☐ NO2 Tropospheric Column Amount

10^15 molec/cm^2

OMNO2d.003

Aura OMI

2004/10/01 - 2014/01/21

☒ NO2 Tropospheric Column Amount (Cloud-Screened at 30%)

10^15 molec/cm^2

OMNO2d.003

Aura OMI

2004/10/01 - 2014/01/21



Giovanni - The Bridge Between Data and Science

+ ABOUT GIOVANNI

+ NEWS

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+ FEEDBACK

+ RELEASE NOTES

+ HELP

OMI/Aura Online Visualization and Analysis

Daily Level 3 Global Gridded Products

Home

Result #1



Results #2



Remove All

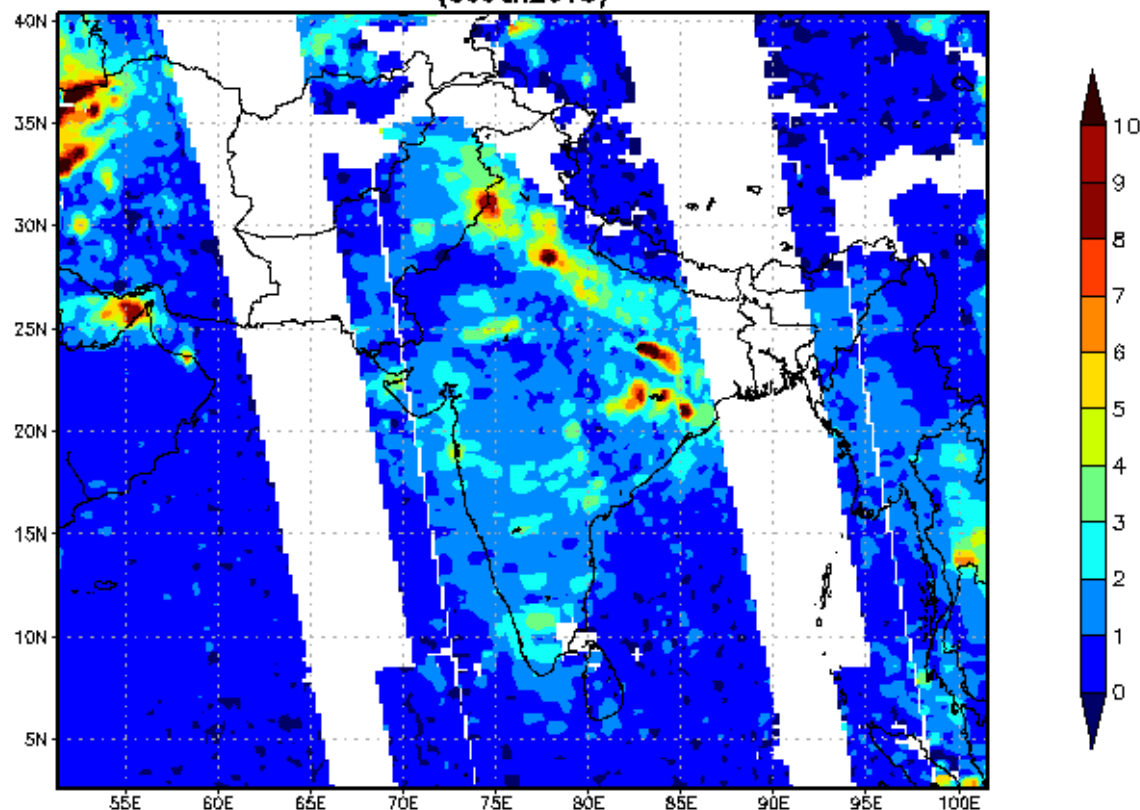
Visualization Results

Download Data

Product Lineage

Acknowledgment Policy

OMNO2d.003 NO2 Tropospheric Column Amount [10^{15} molec/cm²]
(09Jan2013)





National Aeronautics
and Space Administration

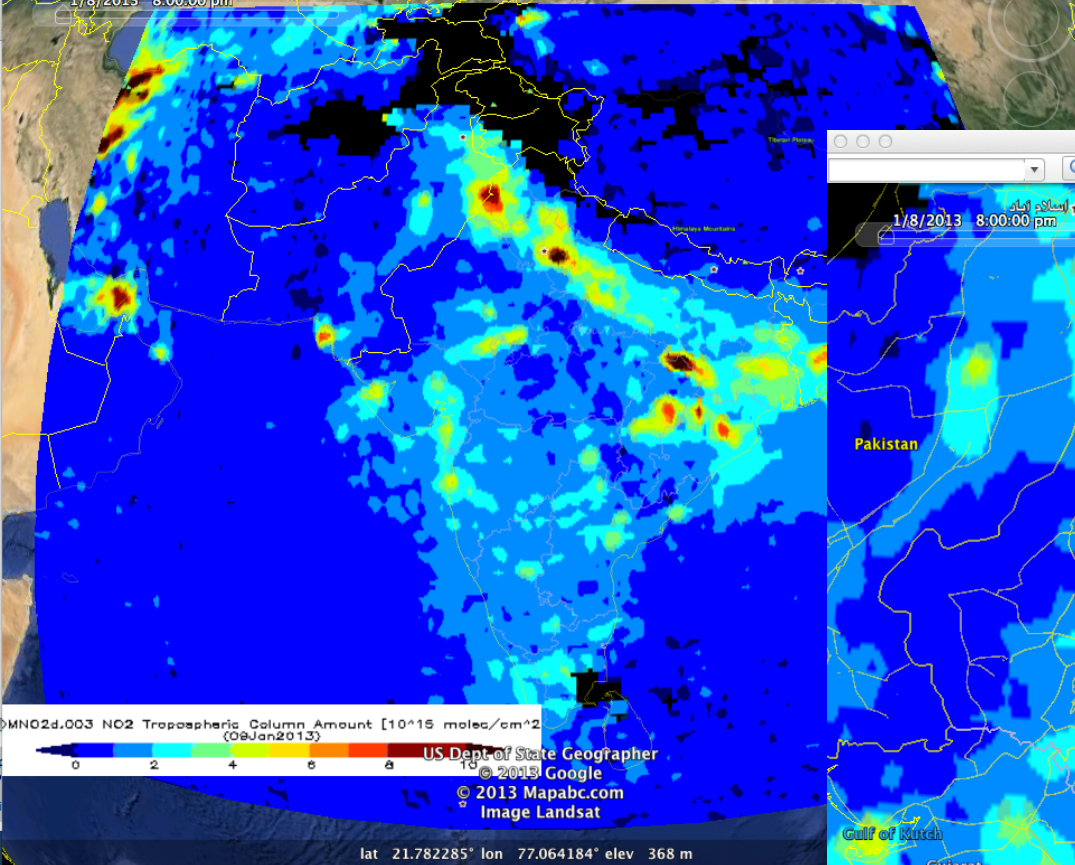
Search DISC

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+ Advanced Search

Google Earth

1/8/2013 8:00:00 pm



PMN02d.003 NO2 Tropospheric Column Amount [10^{15} moles/cm²]
(09Jan2013)

US Dept of State Geographer

© 2013 Google

© 2013 Mapabc.com
Image Landsat

lat 21.782285° lon 77.064184° elev 368 m



Responsible NASA Official: Steven.J.Kempler@nasa.gov
Web Curator: M. Hegde <gsfc-giovanni-disc@lists.nasa.gov>

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FEEDBACK

+ RELEASE NOTES

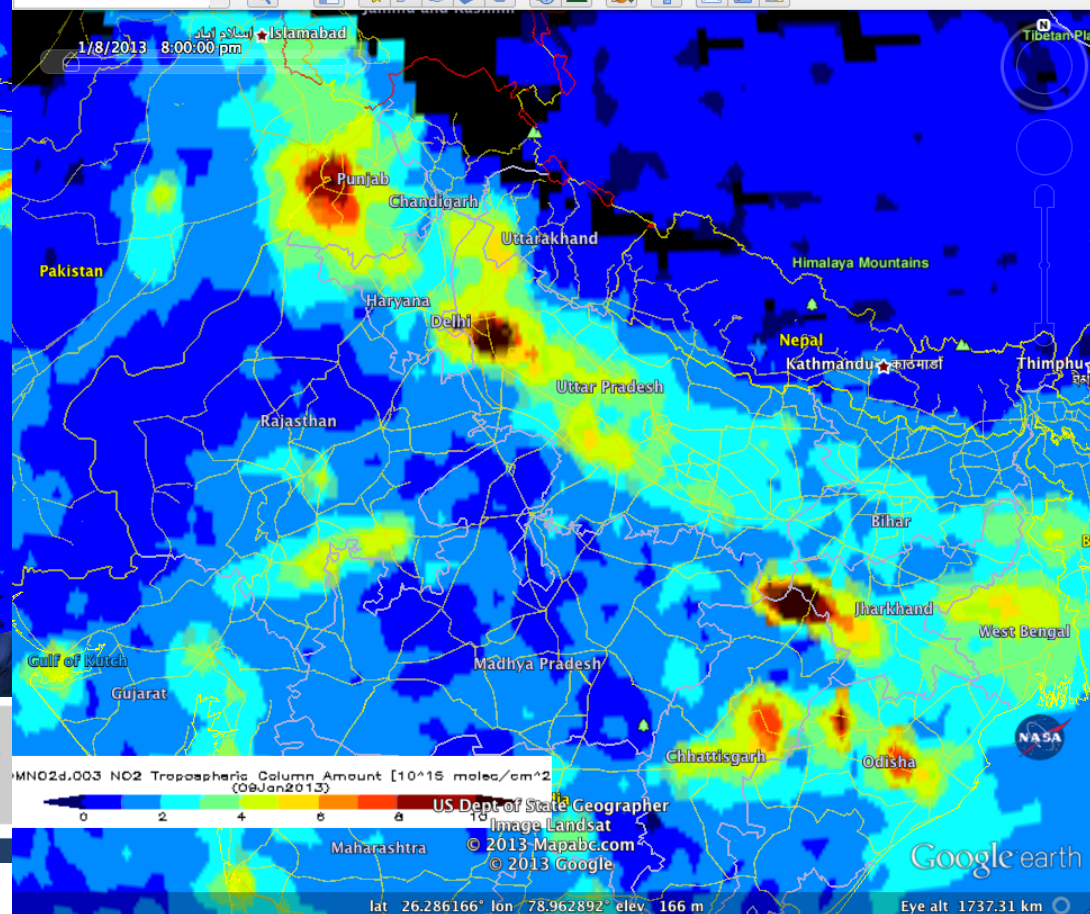
+ HELP

on and Analysis

l Products

Google Earth

1/8/2013 8:00:00 pm Islamabad



PMN02d.003 NO2 Tropospheric Column Amount [10^{15} moles/cm²]
(09Jan2013)

US Dept of State Geographer

© 2013 Google

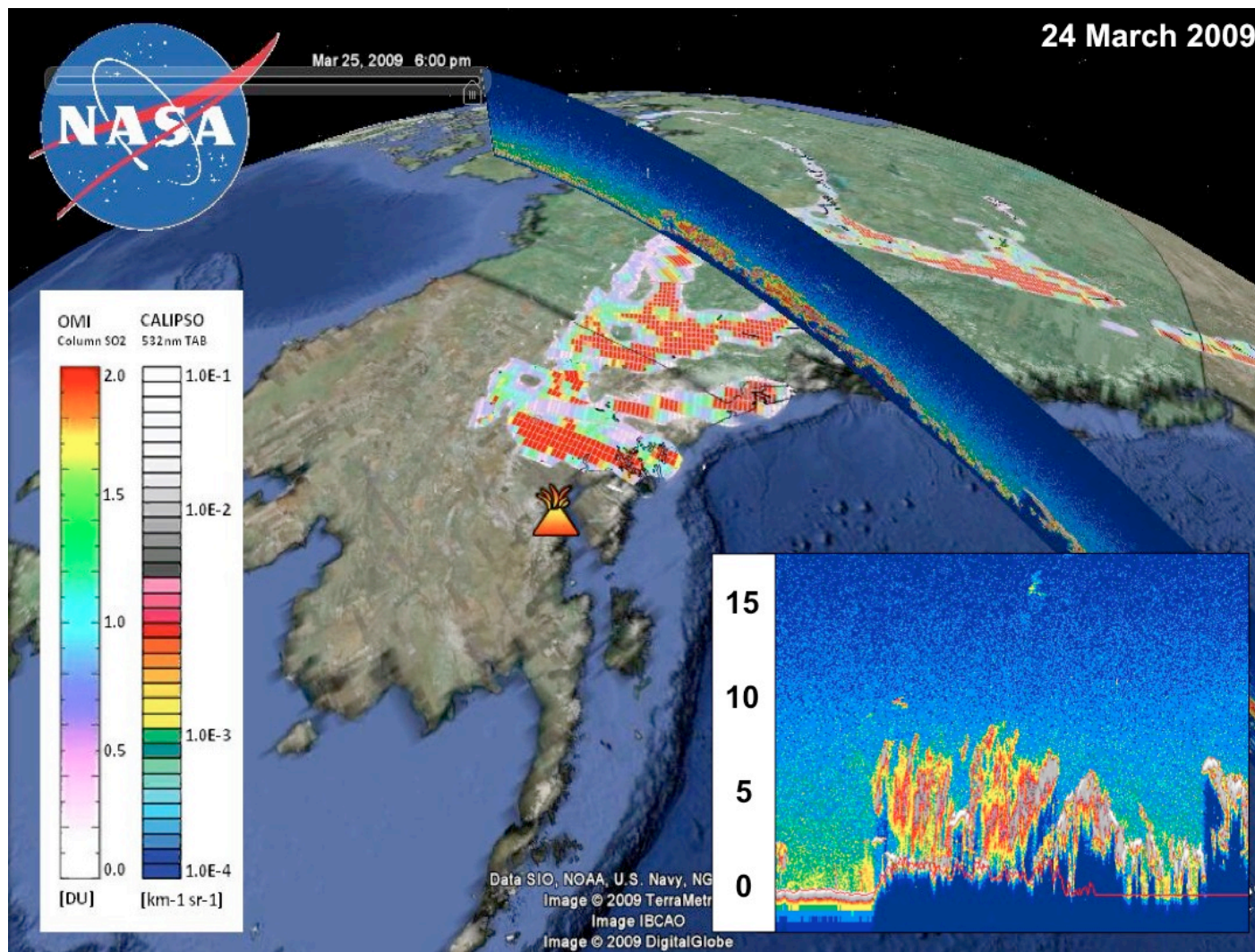
© 2013 Mapabc.com
© 2013 Google

lat 26.286166° lon 78.962892° elev 166 m

Google earth

Eye alt 1737.31 km

Aura/OMI SO₂



A case study of the 2009 eruption of Mt. Redoubt, Alaska, US

The dispersion of volcanic ash was monitored using OMI column SO₂ and CALIPSO backscatter data.

OMI SO₂ Gridded Product Summary

- The OMI data product file contains 4 estimates of the total SO₂ column in Dobson Units.
- These correspond to 4 a-priori (climatological) vertical profiles for the SO₂ used in the retrieval algorithm.
- The 4 vertical profiles represent typical SO₂ vertical distributions for 4 SO₂ source regimes:

SO ₂ Product	Level	Data Short Name	Sensitivity	Use
PBL SO ₂	L3, 0.25°x0.25°	OMSO2e	< 1 km	Fossil fuel, industry
TRL SO ₂ (Lower Troposphere)	L2G, 0.25°x0.25°	OMSO2G	~ 3 km	Industry outflow
TRM SO ₂ (Mid-Troposphere)	L2G, 0.25°x0.25°	OMSO2G	5 - 10 km	optimized for volcanic degassing with vents at ~5km altitude or above and emissions from effusive eruptions.
STL SO ₂ (Lower Stratosphere)	L2G, 0.25°x0.25°	OMSO2G	15 – 20 km	intended for use with explosive volcanic eruptions

Note: OMISO2e ‘best’ product: Screens anomalous values due to cloudiness, high terrain and instrumental effects (row anomaly)
. L2G data are NOT screened.

OMI AQ SO₂ product in the boundary Layer

Data Set Short Name = OMSO2e

Product Level = 3

Begin Date = October 1, 2004

Resolution = 0.25°lon x 0.25°lat

Version = 003

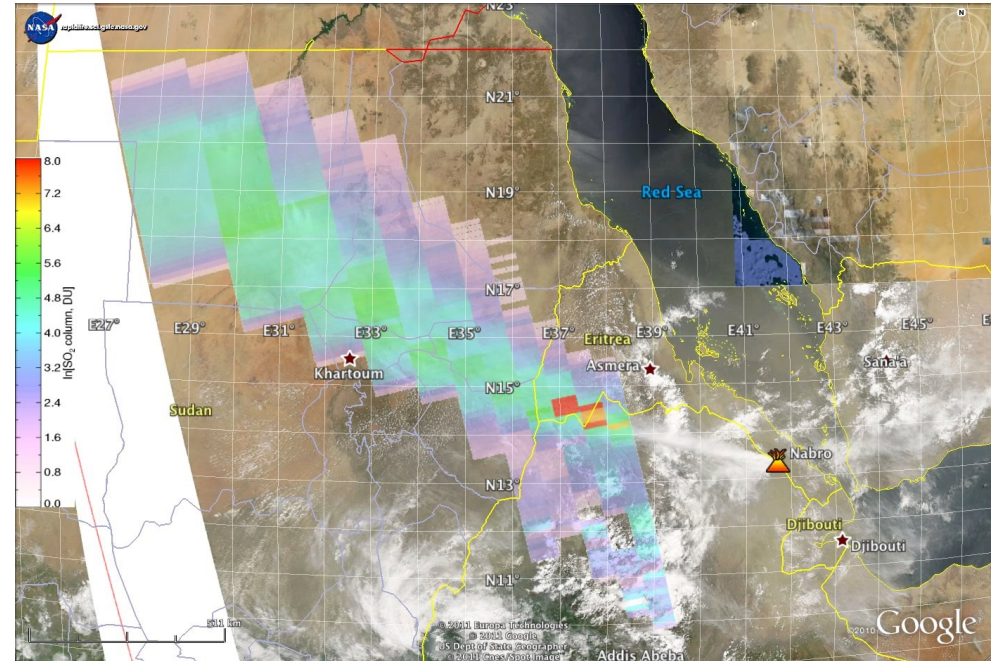
Cloud-screened best measurement

Production Frequency: Daily

Granule (File) Coverage: 15 orbits

File Size(Approx): 5 MB

Contains **best** pixel data, screened for OMI row anomaly, clouds, and other data quality flags.



Aqua MODIS visible image of the Nabro (Eritrea) eruption on June 13, 2011 and the SO₂ plume overlaid.

Examples of OMI SO₂ Applications



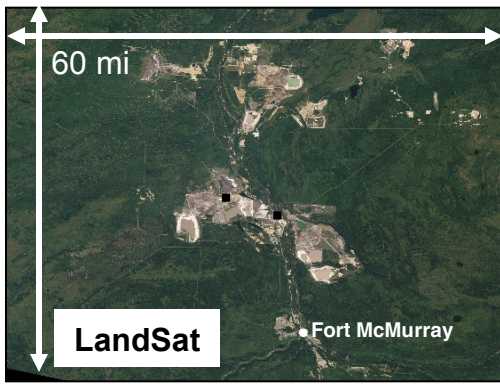
Aura/OMI measurements show distinct enhancements in NO₂ and SO₂ amounts over the Canadian oil sands



Environment Canada Environnement Canada



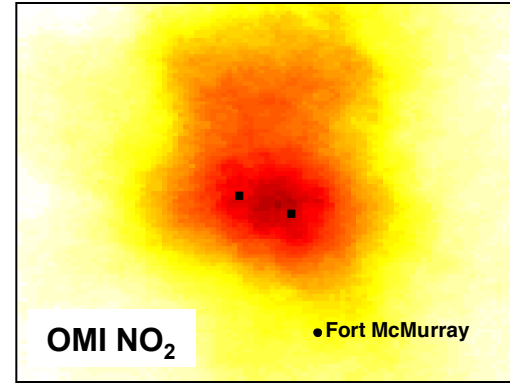
Koninklijk Nederlands Meteorologisch Instituut
Ministerie van Infrastructuur en Milieu



LandSat

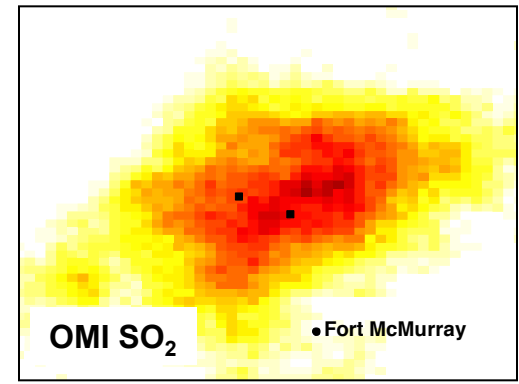
Fort McMurray

■ Surface Mining Operations



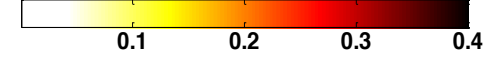
OMI NO₂

Fort McMurray

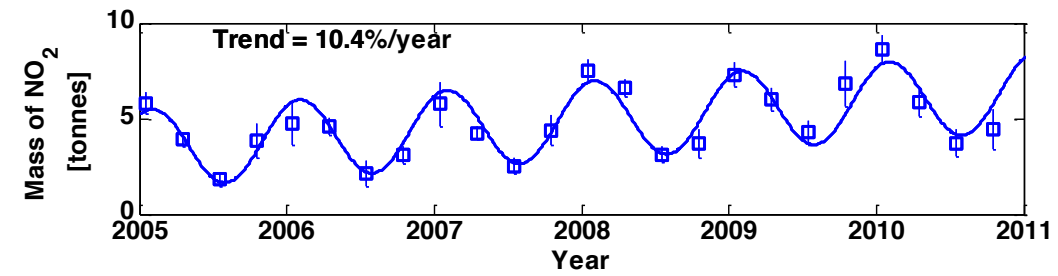


OMI SO₂

Fort McMurray



Location of Oil Sands

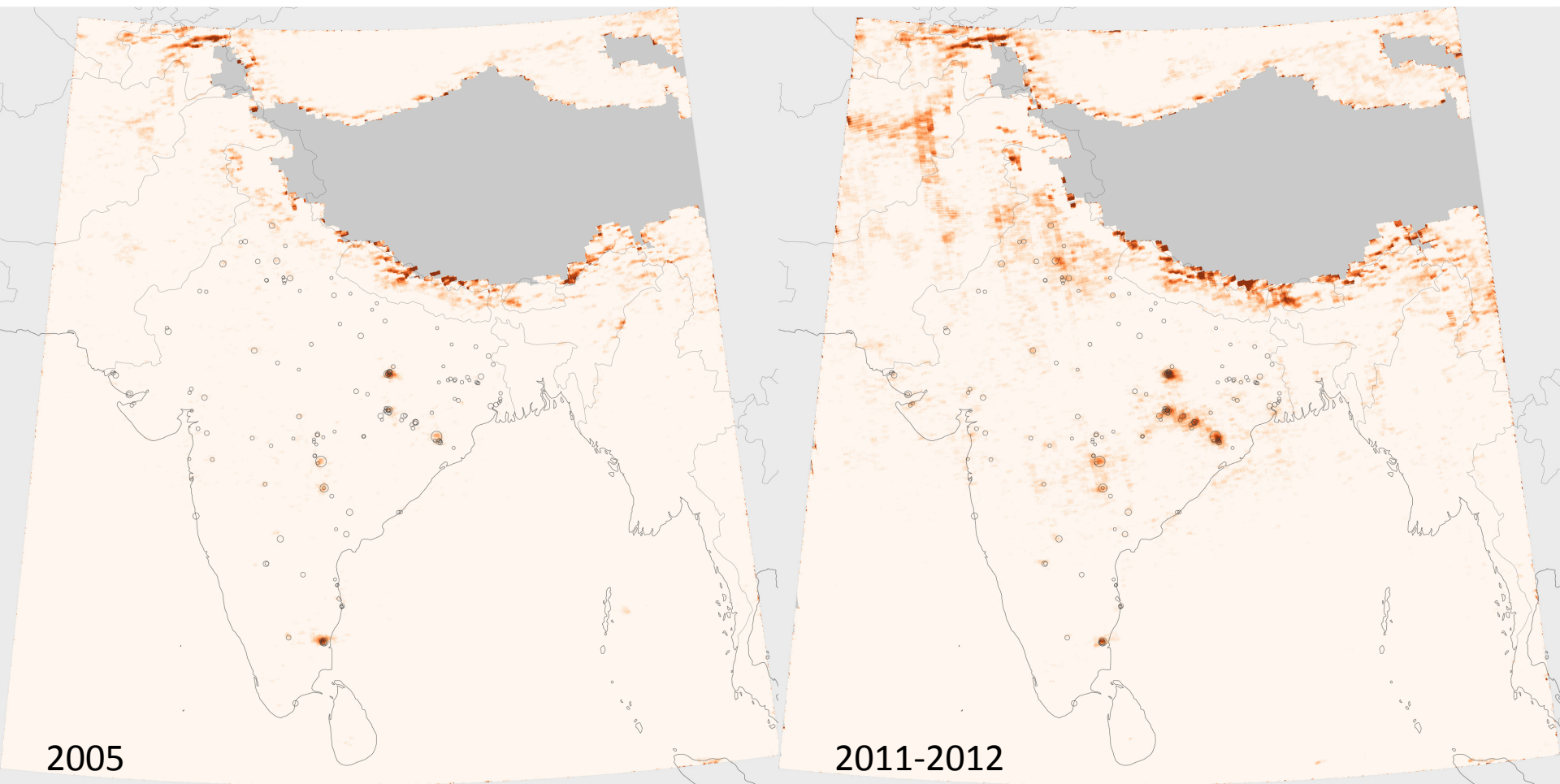


Data from the Ozone Monitoring Instrument (OMI) reveal distinct enhancements in nitrogen dioxide (NO₂) and sulfur dioxide (SO₂) over a region of surface mining in the Canadian oil sands. The oil sands are located in the north-east corner of the province of Alberta, Canada and contain the second largest reserve (after Saudi Arabia) of oil globally. Shown along the top are maps over a portion of the oil sands where extensive surface mining occurs. These maps cover the same area: a NASA LandSat image from 2009 indicating vegetation removal in region of surface mining (left), OMI mean NO₂ (middle), and OMI mean SO₂ (right). OMI data were averaged over the period 2005-2010. White values indicate background levels, increasing through yellow-orange, with brown-black the largest. Maximum values clearly correspond to the location of the industrial activity. The time graph shows that NO₂ has been increasing at a rate of 10%/year over this period. Maximum values are comparable to those seen over medium-to-large North American power plants. These results make use of improved OMI mapping techniques to resolve detail down to 5 miles. These are the first satellite-based results of pollution over the oil sands.

McLinden, C., et al., (2012), *Geophysical Research Letters*, in press

Aura/OMI SO₂

<http://earthobservatory.nasa.gov/IOTD/view.php?id=82626>





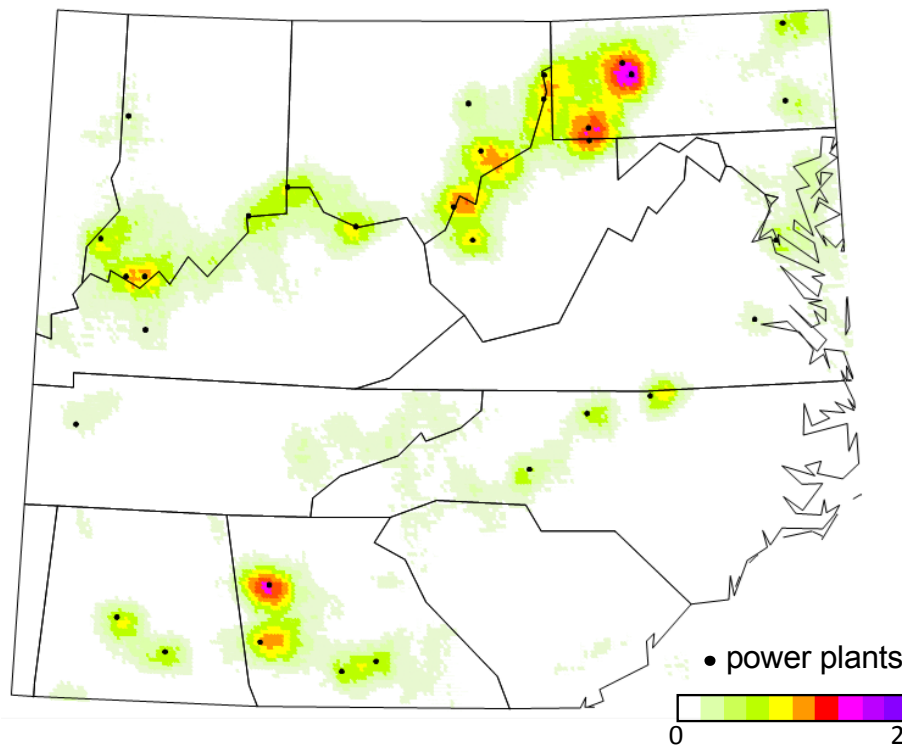
Aura/OMI measurements show a decrease in SO₂ amounts over the Eastern United States



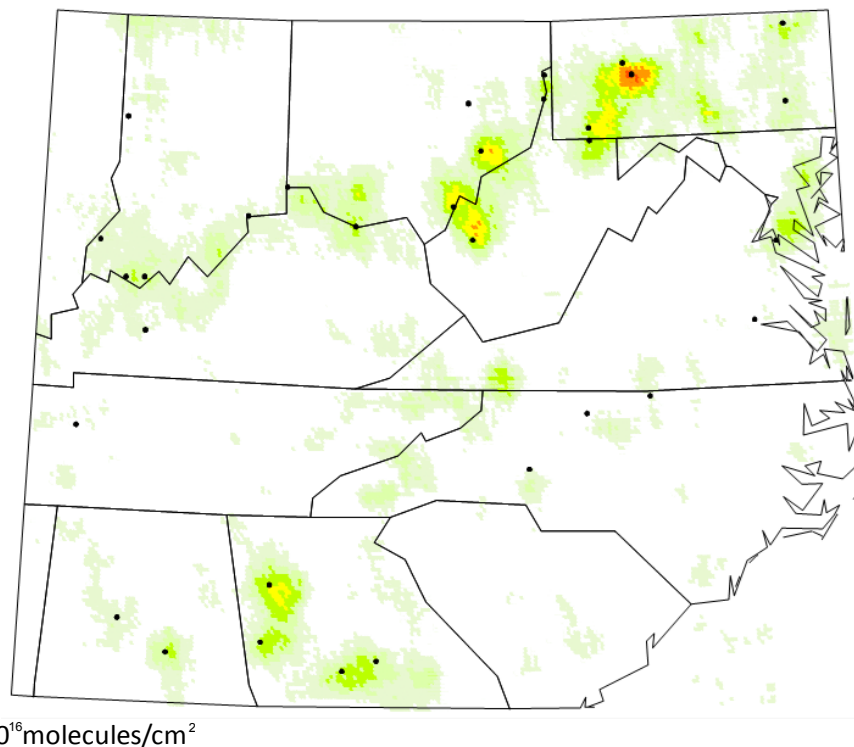
Environment
Canada

Environnement
Canada

Mean SO₂ values for 2005-2007



Mean SO₂ values for 2008-2010



The Ozone Monitoring Instrument (OMI) data confirm a substantial reduction in sulfur dioxide (SO₂) values around the largest US coal power plants as a result of the implementation of SO₂ pollution control measures. The figure shows average SO₂ values measured by OMI on the NASA Aura spacecraft for the periods 2005-2007 and 2008-2010 over the Eastern US where the majority of large SO₂ sources are located. Scientists use this information to identify anthropogenic sources of SO₂ and to estimate their emission rates. The greatest values are in violet; the lowest in green. Yellow to violet colors correspond to statistically significant enhancements in SO₂ pollution in the vicinity of largest SO₂ emitting coal-burning power plants indicated by the black dots.

Previous use of space-based SO₂ retrievals has been limited to monitoring plumes from volcanic eruptions and detecting anthropogenic emissions from large source regions as in China. A new spatial filtration technique allows detection of individual pollution sources in Canada and US.

Fioletov, V., et al., (2011), *Geophysical Research Letters*

Data/Images Access

Global Sulfur Dioxide Monitoring Homepage

- <http://so2.gsfc.nasa.gov/>
- Images, Documentation, Publications and Links

GES-DISC (Goddard Earth Science Data and Information Services Center)

- Level 2, L2G, Level 3 (OMSO2e)
- HDF and NetCDF
- Documentation

GIOVANNI – An interactive visualization tool

- L2G, Level 3 (OMSO2e)
- HDF, ASCII, KML for Google Earth
- Subsetting available

Worldview - Images





<http://so2.gsfc.nasa.gov>

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Volcanic Hazards Project



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Global Sulfur Dioxide Monitoring Documentation

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Documentation

Here is an introduction to SO₂, sulfur dioxide.

The **OMSO2 Readme** file is a user's Guide to the OMI operational SO₂ data. This file contains short descriptions of volcanic and pollution SO₂ data, current algorithms and limitations and accuracy of the products.

The **OMSO2.fs** is a detailed file specification. It specifies the product format for the current version and describes all parameters and ancillary parameters.

The **OMSO2 AMF corrections** file defines the air mass factor (AMF) that is used to produce the operational planetary boundary layer SO₂ data and describes the user applied AMF corrections to the operational data.

The **OMSO@ Release Details** file describes known issues in the current version of the SO₂ data and differences from previous versions.

The **Linear Fit Algorithm Description** file is a JGR paper describing the operational volcanic SO₂ algorithm.

The **BRD Algorithm Description** is an IEEE TGRS paper that describes the pollution SO₂ algorithm.

OMSO2 Readme file	html	pdf	doc
OMSO2.fs file	html	pdf	doc
OMSO2 AMF corrections file	html	pdf	doc
OMSO2 Release Details file	html	pdf	doc
Linear Fit Algorithm Description	html	pdf	
BRD Algorithm Description		pdf	



National Aeronautics and Space Administration
Goddard Space Flight Center

Flight Projects | Sciences and Exploration

<http://so2.gsfc.nasa.gov>

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Volcanic Hazards Project

[test SO₂ eruption alerts](#) [NOAA-NESDIS](#). [SACS_BIRA](#). [IASI-ULB](#).

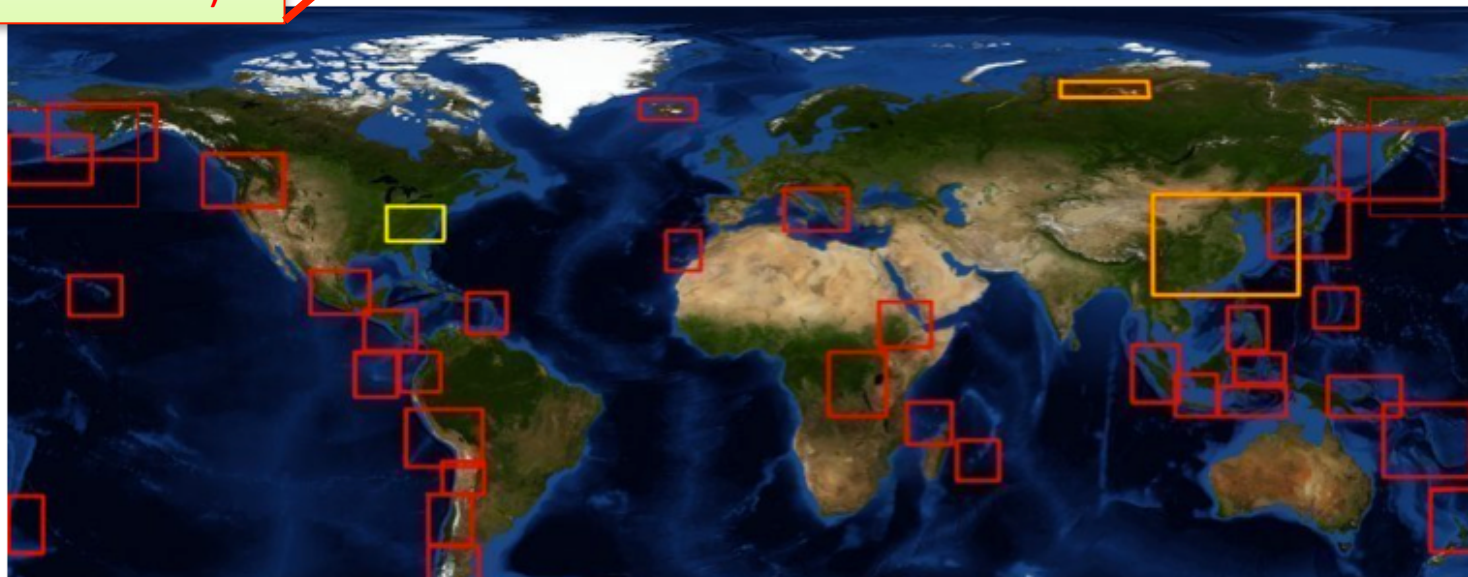
SO₂ Near Real-Time Images: [Real-Time \(15 mins\)](#). [NOAA Near Real-Time \(3 hours\)](#). [AIRS NRT](#). [NASA NRT](#). [SACS-BIRA NRT](#).

MEaSUREs project:

[Images \(1979-2005\)](#) | [AIRS images \(2003-2004\)](#) | [OMI images \(2004-present\)](#) | [OMPS images \(May 2012-present\)](#)

Daily (OMI/OMPS) Images of SO₂ (click on a highlighted rectangle)

Volcanic regions, **orange** = daily pollution regions, **yellow** = long-term pollution images



Near-real
time SO₂
maps over
Europe only

NOAA Level 2 volcanic
SO₂ images and
archived data (various
formats, specific sites)

Data/Images Access

Global Sulfur Dioxide Monitoring Homepage

- <http://so2.gsfc.nasa.gov/>
- Images, Documentation, Publications and Links

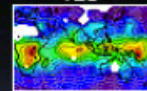
GES-DISC (Goddard Earth Science Data and Information Services Center)

- http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omso2e_v003.shtml
- Level 2, L2G, Level 3 (OMSO2e)
- HDF and NetCDF
- Documentation


GIOVANNI – An interactive visualization tool

- L2G, Level 3 (OMSO2e)
- HDF, ASCII, KML for Google Earth
- Subsetting available

Worldview - Images



- Aura Validation Data Center (AVDC)


NASA Earth Data

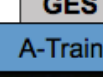
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and Information Services Center

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[Mission Portals](#)

[A-Train](#)

[AIRS](#)

[Aura](#)

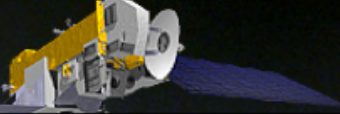
[Modeling](#)

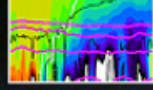
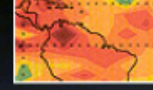
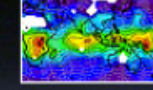
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AURA

>> DATA HOLDINGS

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+ [OMI](#)
+ MLS
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You are here: [GES DISC Home](#) » [Aura](#) » [Data Holdings](#) » [OMI](#) » Aura OMI Sulphur Dioxide Level 3 Best Pixel Global (0.25 deg Lat/Lon grids) Data Product-OMSO2e

Aura OMI Sulphur Dioxide Level 3 Best Pixel Global (0.25 deg Lat/Lon grids) Data Product-OMSO2e

NEWS: OMOS2e is a Level-3 product (contains best pixel data, screened for OMI row anomaly and other data quality flags)

Data Access

- Mirador - fast search & download**

SO2 Plume from Nyamuragira Volcano
(OMI SO2 Amount, avg Nov 28- Dec 4, 2006)



Principal Investigator (PI):
Nickolay A. Krotkov
(NASA GSFC)

Platform: EOS-Aura
Instrument: OMI

Product: Level-3 OMI Sulphur Dioxide (SO2) Data Product

Data Set Short Name: OMOS2e

Data Set Long Name: OMI/Aura Sulfur Dioxide (SO2) Total Column Daily L3 Best Pixel Global 0.25deg Lat/Lon Grid

OMI Data Documents:
[-Short Readme for OMOS2e](#)
[- File Format Specification](#)
[- OMI Data User's Guide](#)

[-OMI Algorithm Documents Related to OMOS2 \(the data used in OMOS2e\)](#)
[- OMI Algorithm Theoretical Basis Documents](#)



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You are here: [Keyword Search](#)

Keyword

Projects

Science Areas

Keyword: OMSO2e

Time Span: 2013-01-09

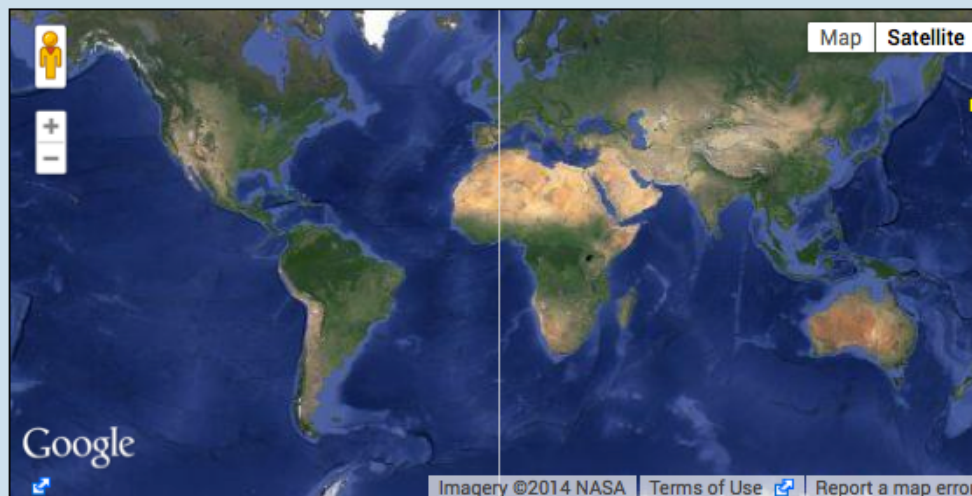
To: 2013-01-12



Location:

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**GES DISC**Goddard Earth Sciences Data
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You are here: [KeywordSearch](#) » [Data sets from OMSO2e search](#) » [File Listing](#) » [Service Selection](#) » [Your Cart](#) » [Checkout](#)

Keyword

Projects

Science Areas

Data SetsResults 1 - 1 of 1 for **OMSO2e** (1 seconds)

-More Services (e.g. http download, format conversion, subsets etc) are available for the data set(s). Whenever you add files to the shopping cart, you will be presented with options for selecting a service and service parameters for any data set which has these services.

☐ **OMI/Aura Sulfur Dioxide (SO₂) Total Column Daily L3 Best Pixel Global 0.25deg Lat/Lon Grid (OMSO2e)** [View Files](#) | [Info](#) | [Giovanni Analysis](#) | [Data Calendar](#)**Approx. 4 files found (Avg Size: 5.37 MB)****Parameters:** SULFUR OXIDES, TRACE GASES/TRACE SPECIES, INDUSTRIAL EMISSIONS, ERUPTION DYNAMICS, SULFUR DIOXIDE**Spatial Resolution:** 0.25 degree x 0.25 degree**Temporal Resolution:** Approx 1 hour (day time orbit)

Select All

Reset

List Selected Files By Time

See Timeline View

Add Selected Files To Cart

NASA Search Results

(Number of files found may not be entirely accurate)

Page: 1



File Name Convention

OMI-Aura_L3-OMSO2e_2006m0306_v003-2012m0409t120910.he5

Level 3 Data product short name "e" = extended product Version 3 Date (3/6/06) Processing Date (4/9/12) Time (12:09:10) Data Format (HDF5)

Mirador (<http://mirador.gsfc.nasa.gov/>) Keyword search : SO2

Results 1 - 1 for **OMSO2e** (1 second)

OMI/Aura Sulfur Dioxide (SO2) Total Column Daily L3 Best Pixel Global 0.25deg Lat/Lon Grid [Info](#)

The following services are available for the data set(s). Whenever you add files to the shopping cart, you will be presented with options for selecting these services.

[Download via HTTP](#) [Convert to NetCDF](#)

<input checked="" type="checkbox"/> Select All in Page <input type="checkbox"/> File Names/Descriptive File Names	Start Time
<input checked="" type="checkbox"/> OMI-Aura_L3-OMSO2e_2007m0815_v003-2012m0409t132333.he5 (7.04 MB) One Click Download: (FTP) (HTTP) NetCDF OPeNDAP	2007-08-15 00:00:00 Metadata

Add Selected Files To Cart

Add All Files in All Pages To Cart



Data/Images Access

Global Sulfur Dioxide Monitoring Homepage

- <http://so2.gsfc.nasa.gov/>
- Images, Documentation, Publications and Links

GES-DISC (Goddard Earth Science Data and Information Services Center)

- http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omso2e_v003.shtml
- Level 2, L2G, Level 3 (OMSO2e)
- HDF and NetCDF
- Documentation

GIOVANNI – An interactive visualization tool

- <http://disc.sci.gsfc.nasa.gov/giovanni>
- L2G, Level 3 (OMSO2e)
- HDF, ASCII, KML for Google Earth
- Subsetting available

Worldview - Images



Giovanni - The Bridge Between Data and Science

» OVERVIEW

- + What is Giovanni?
- + Who Uses Giovanni?
- + Giovanni Parameters
- + Giovanni Plot Types
- + How to Use Giovanni
- + How to Acknowledge Giovanni
- + Acknowledgements

Additional Features

- + News
- + Users Manual
- + Publications
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- + Feedback
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You are here: [GES DISC Home](#) » Giovanni - Interactive Visualization and Analysis

Giovanni - Interactive Visualization and Analysis

Contributors: [tonyr](#), [rchowdhury](#)

Giovanni - Interactive Visualization and Analysis - GES DISC: Goddard Earth Sciences, Data and Information Services Center

Giovanni-4 Now Available

New! Please try out [Giovanni-4](#), the next generation of Giovanni, with dramatically improved performance and interactive plotting and mapping. (Currently, only select Aerosols, Hydrology and Turbulent Flux data are available in Giovanni-4, with more on the way.)

Giovanni Portals

Giovanni Parameter List

▼ Atmospheric Portals (Scroll down to view complete list)

- [Aqua/AIRS Global: Monthly](#)
- [Terra and Aqua MODIS: Daily](#)
- [Terra and Aqua MODIS: Monthly](#)
- [Aura OMI Level 3](#)
- [Aura OMI Level 2G](#)
- [Aura Microwave Limb Sounder \(MLS\)](#)
- [Aura High Resolution Dynamics Limb Sounder \(HIRDLS\)](#)
- [Aura Tropospheric Emission Spectrometer \(TES\)](#)
- [Earth Probe and Nimbus-7 TOMS](#)
- [Upper Atmosphere Research Satellite \(UARS\) Halogen Occultation Experiment \(HALOE\)](#)

GIOVANNI NEWS

Giovanni Image Hall of Fame issue of The Giovanni News is online

Jan 10, 2014

Several members of the GES DISC attend ESIP Federation Winter Meeting 2014

Jan 07, 2014

December 2013 AGU special issue of The Giovanni News is online

Dec 19, 2013

GES DISC participates in AGU Fall Meeting 2013

Dec 06, 2013

October-November 2013 issue of The Giovanni News is online

Nov 22, 2013

MODIS observes progressive development of air pollution crisis in China

Oct 25, 2013

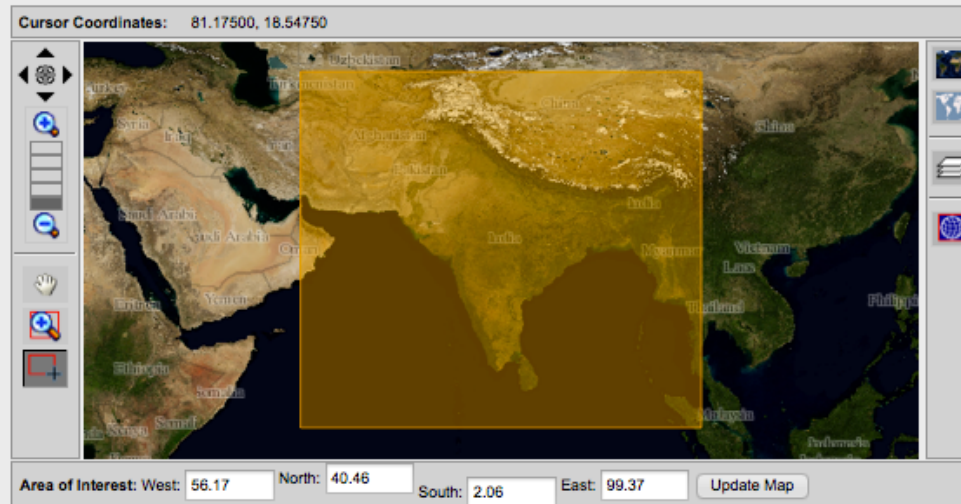
Staff from the GES DISC participate in NSF EarthCube Workshop

Oct 21, 2013

Newest additions to Giovanni publications list

Sep 30, 2013

Spatial



OMI Aerosol Wavelength

Select a wavelength value from the pulldown list. This option is only enabled if a parameter from the OMAEROe product is selected! Otherwise this option is greyed-out and not available.

Wavelength ---

NOTE: Selected 3D parameters must have the same 3rd dimension (e.g., pressure, altitude, wavelength, etc.) units in order to enable the vertical level menu.

Parameters

Display: ☐ Data Product Info ☐ Units ☐ Parameters with > 2 Dimensions

Daily 0.25 x 0.25 Degree Grid

☐ OMAEROe(2004/10/01 - 2014/03/10)

Parameter

- ☐ Absorbing Aerosol Optical Thickness
- ☐ Aerosol Optical Thickness
- ☐ Aerosol Single Scattering Albedo

☐ OMDOAO3e(2004/10/01 - 2014/03/10)

Parameter

- ☐ Column Amount Ozone

☐ OMT03e(2004/10/01 - 2014/03/10)

Parameter

- ☐ Column Amount Ozone
- ☐ Radiative Cloud Fraction

☐ OMSO2e(2004/10/01 - 2014/03/10)

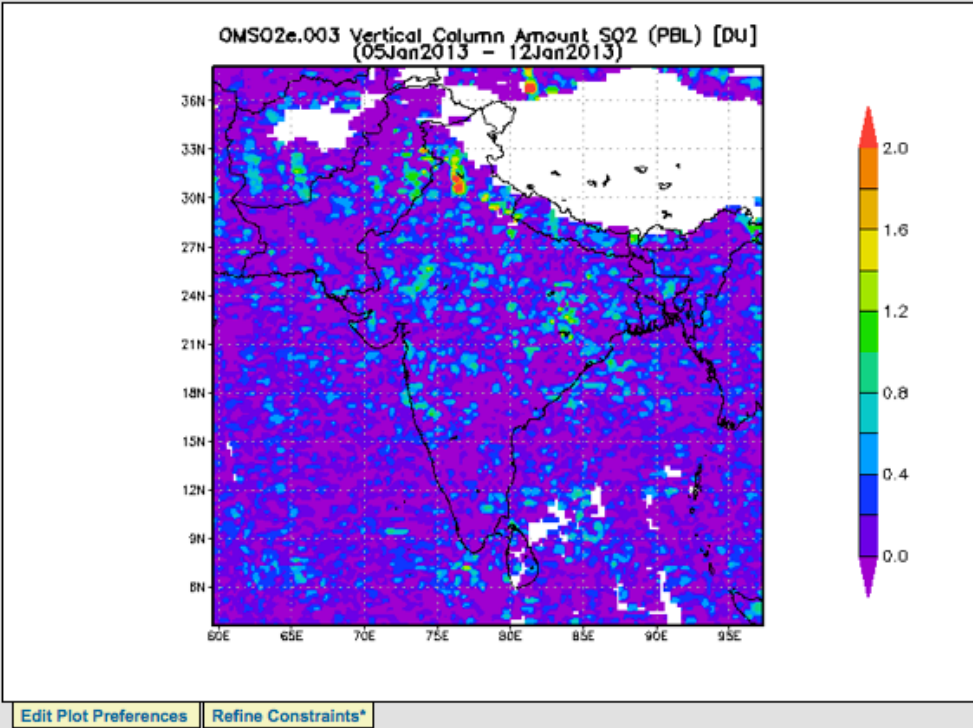
Parameter

- ☒ Vertical Column Amount SO2 (PBL)

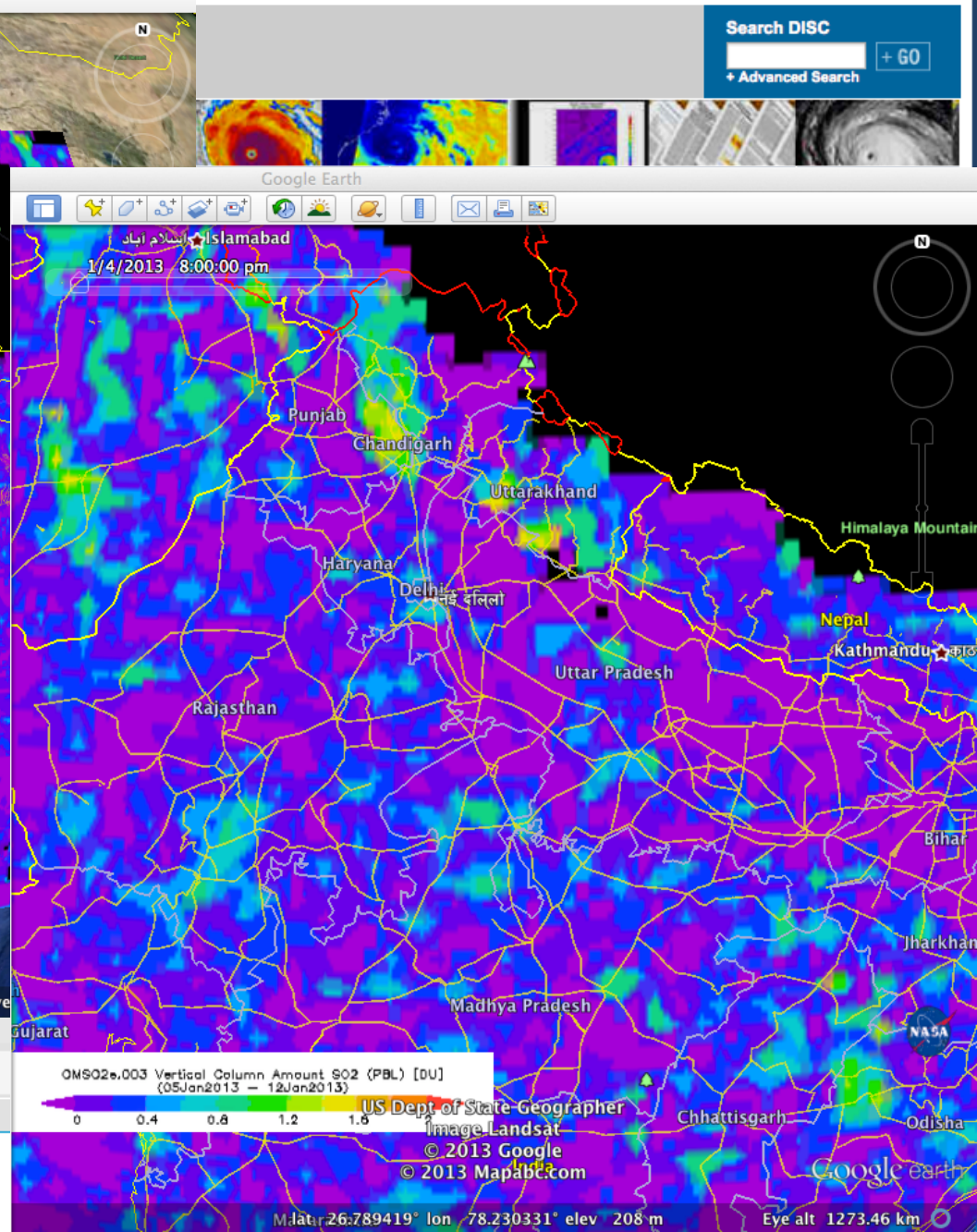
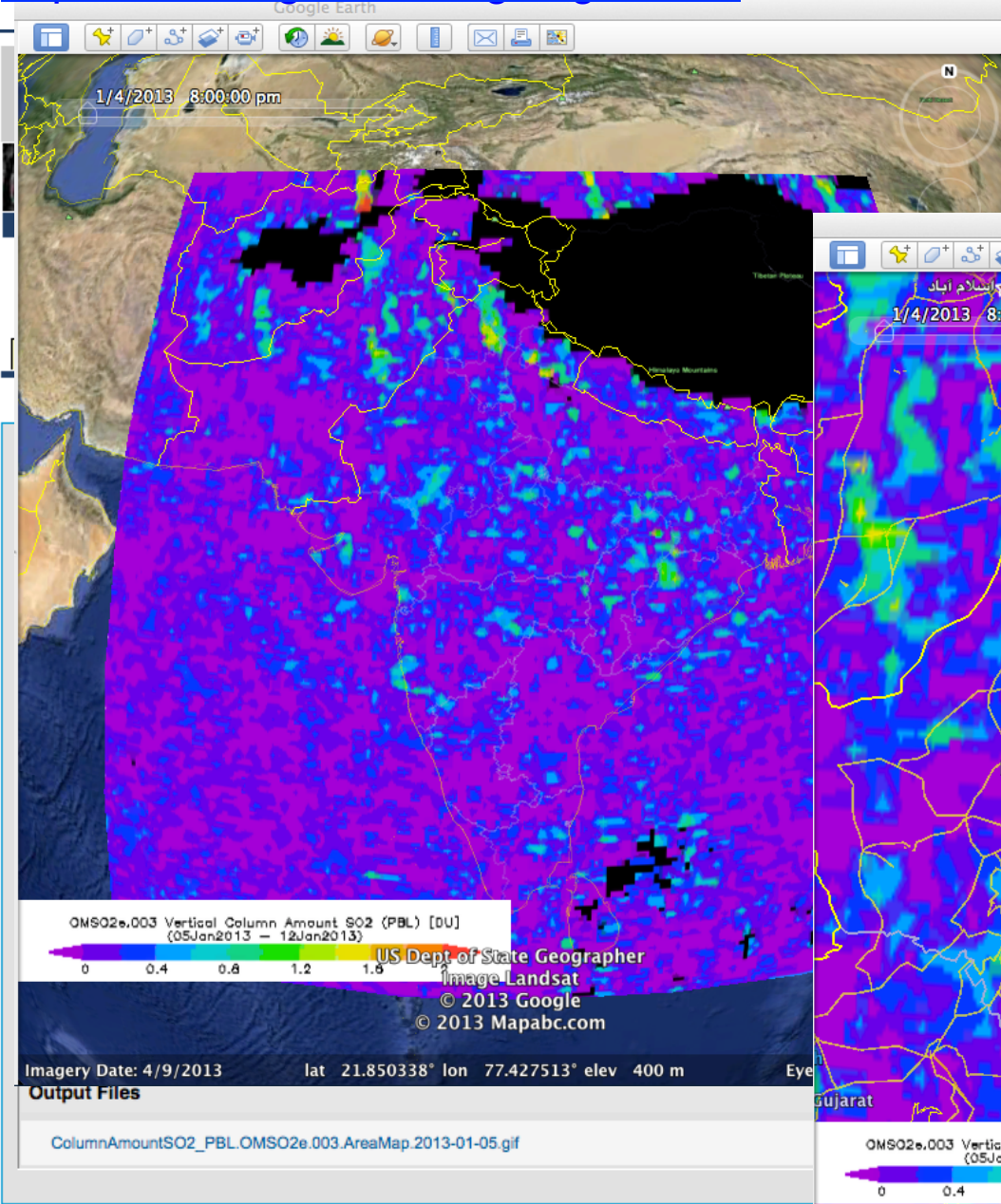
Examine January 5-12, 2013 over India

OMI/Aura Online Visualization and Analysis
Daily Level 3 Global Gridded Products

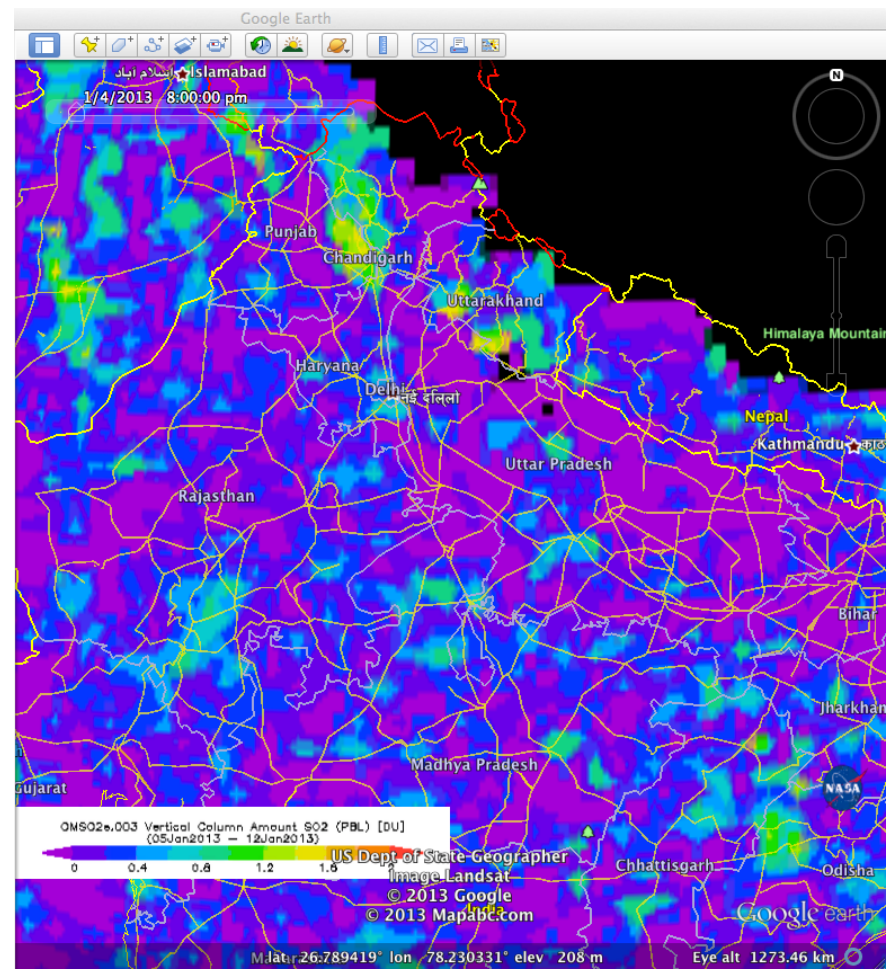
[Visualization Results](#) [Download Data](#) [Product Lineage](#) [Acknowledgment Policy](#)



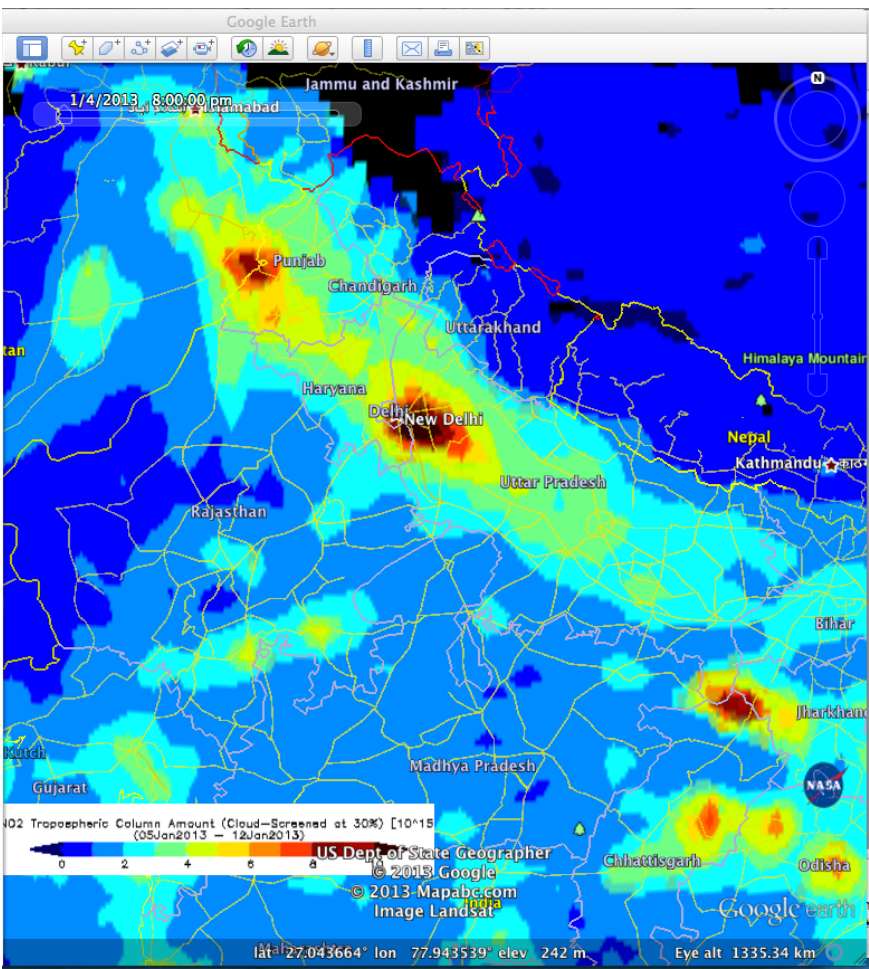
* Applies to the whole results set (all plots)



January 5-12, 2013



SO2



NO2

Data/Images Access

Global Sulfur Dioxide Monitoring Homepage

- <http://so2.gsfc.nasa.gov/>
- Images, Documentation, Publications and Links

GES-DISC (Goddard Earth Science Data and Information Services Center)

- http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omso2e_v003.shtml
- Level 2, L2G, Level 3 (OMSO2e)
- HDF and NetCDF
- Documentation

GIOVANNI – An interactive visualization tool

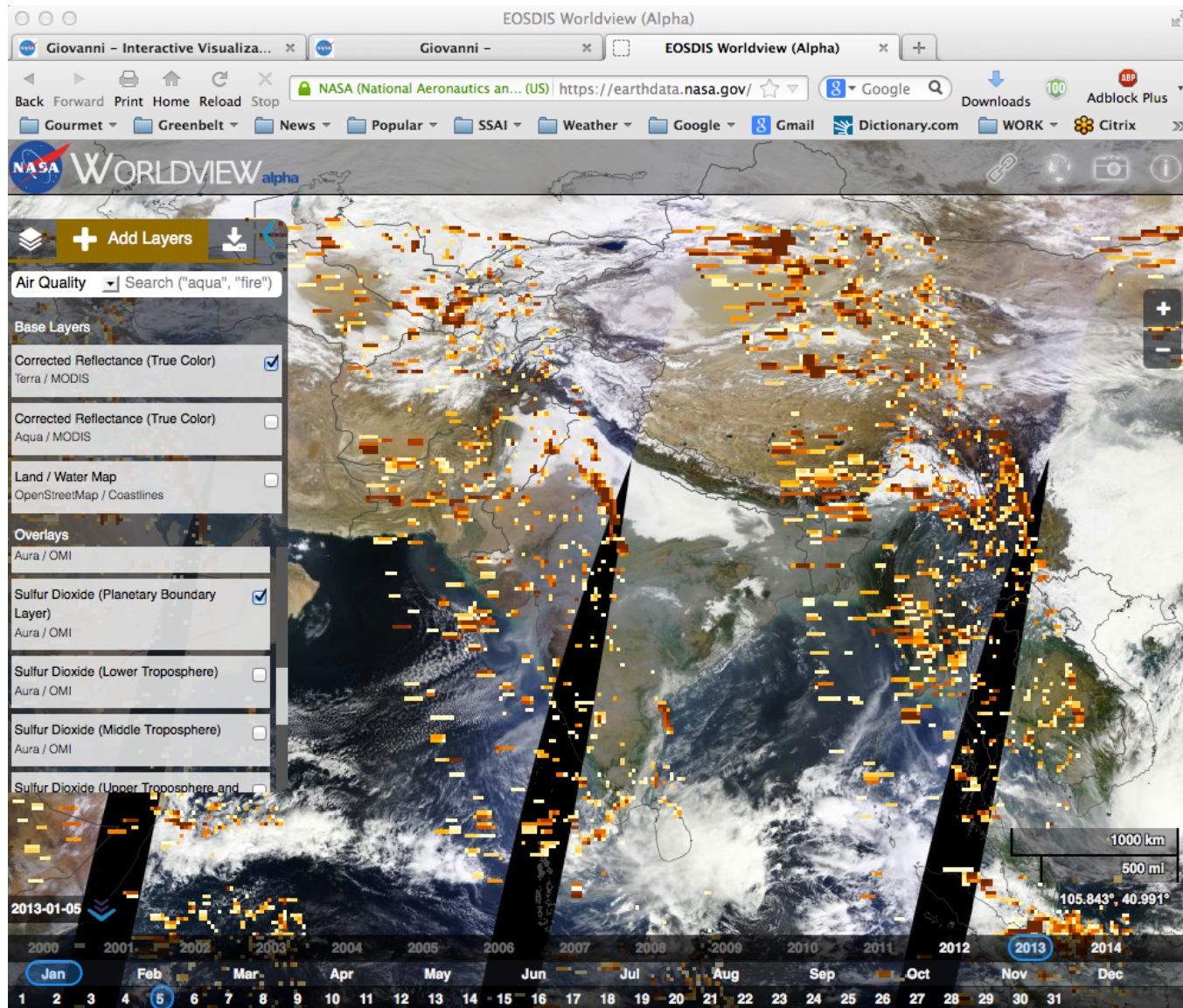
- <http://disc.sci.gsfc.nasa.gov/giovanni>
- L2G, Level 3 (OMSO2e)
- HDF, ASCII, KML for Google Earth
- Subsetting available

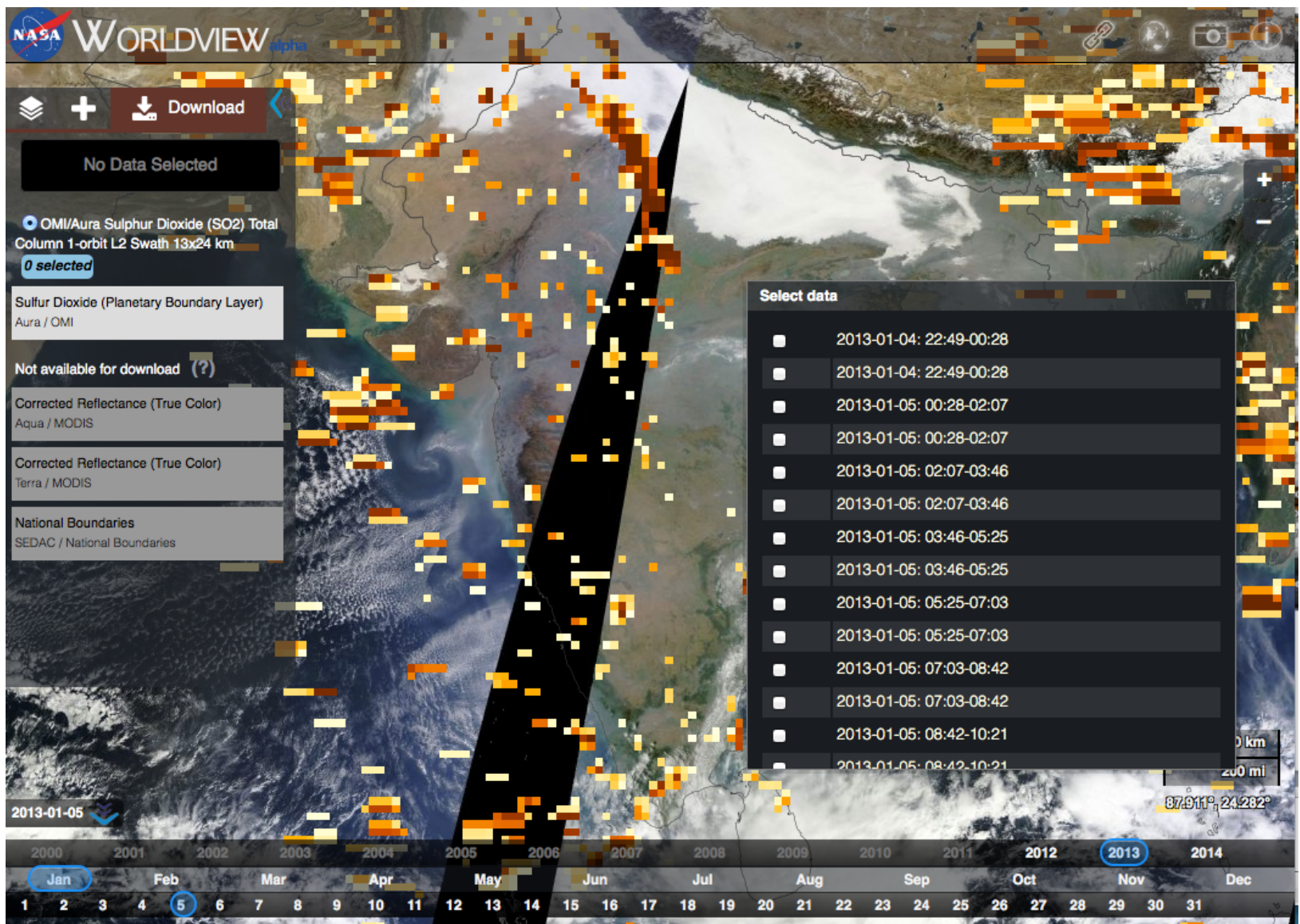
Worldview – Image: <https://earthdata.nasa.gov/labs/worldview/>



Worldview <https://earthdata.nasa.gov/labs/worldview/>

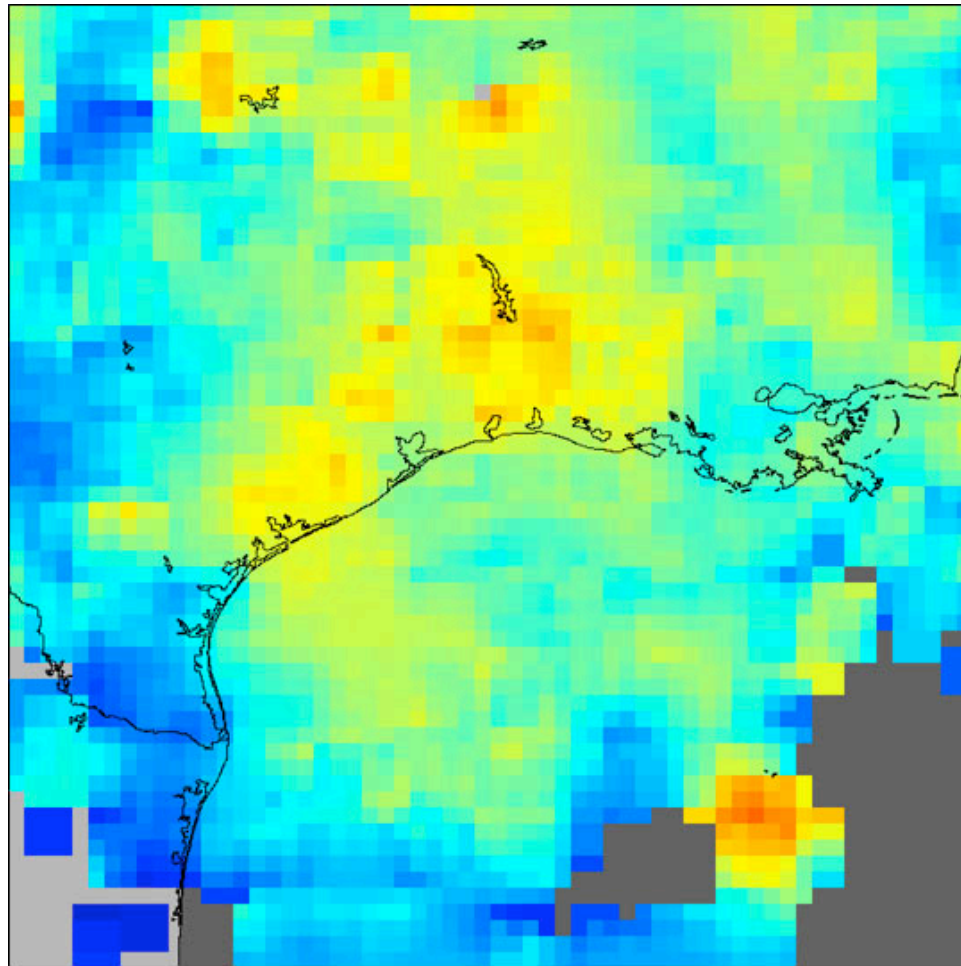
Uses Level 2 orbit data





NOTE: Data can be downloaded (HDF5 Format only) from Worldview BUT it does not subset the data so you don't know which orbit to pick for your region of interest, i.e. over CONUS.

Terra/MOPITT CO



Carbon Monoxide (parts per billion)

0 90 180

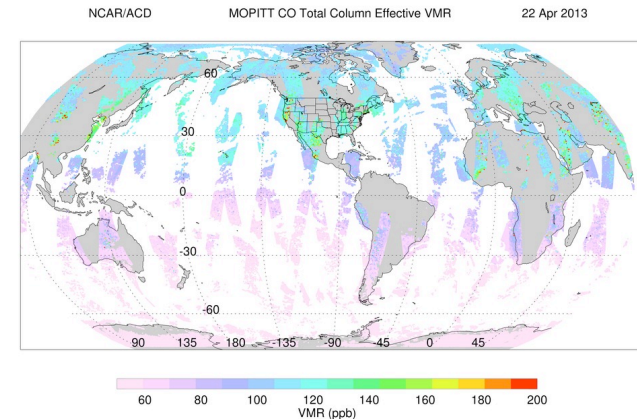
CO plumes at an altitude of roughly 2 km (700 millibars) over the Houston area and extending out over the Bay of Galveston. This image represents a composite of data collected over a 10-day period, September 6-15, 2002, by MOPITT.

<http://earthobservatory.nasa.gov/IOTD/view.php?id=3173>

MOPITT- Measurements of Pollution In The Troposphere

HOMEPAGE = <http://www.acd.ucar.edu/mopitt/>

- Operational since March 2000
- A nadir sounding instrument
- Pixel resolution = $22\text{km} \times 22\text{km}$
- Swath width = 640 km
- Equator Crossing times = 10:00 AM, 10:10PM
- Vertical profiles of CO are obtained at $4.7\text{ }\mu\text{m}$
 - Profile Units = Parts per Billion Volume mixing ratio (ppbv)
- Column CO are obtained at $2.2\text{-}2.4\text{ }\mu\text{m}$
 - Column Units = molecules/cm²
- Current Version 6
- 9 vertical layers 900hPa – 100hPa
- Level 3 gridded data are 1deg x1deg resolution
- Original data format is in HDF



Due to large gaps between swaths, it takes 3 days worth of data to create a global composite



MOPITT V6 Level 2 and 3 products include:

Homepage: <http://www2.acd.ucar.edu/mopitt>

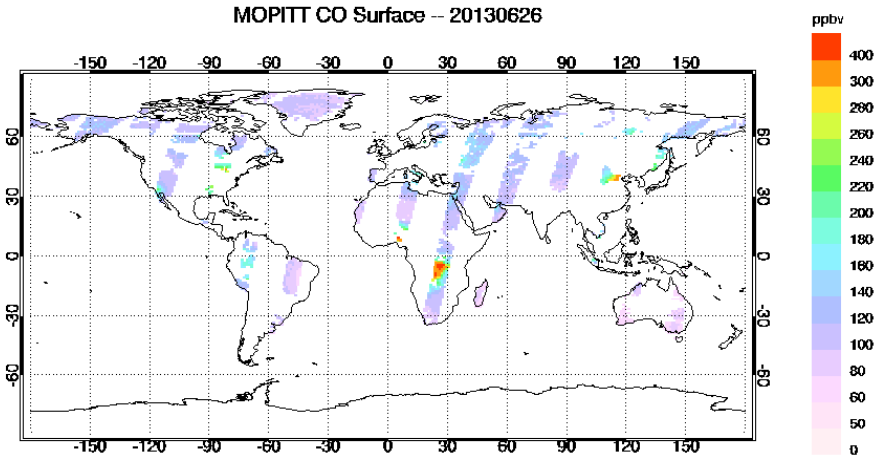
A **TIR-only** product, similar to the MOPITT V4 product and V5 TIR-only product. *Example filename: MOP02T-20010101-L2V16.2.1.he5.*

A **NIR-only** product, similar to the MOPITT V5 NIR-only product. This dataset is produced only for daytime observations over land. This product exhibits relatively large random errors and may require significant spatial and/or temporal averaging. *Example filename: MOP02N-20010101-L2V16.2.2.he5.*

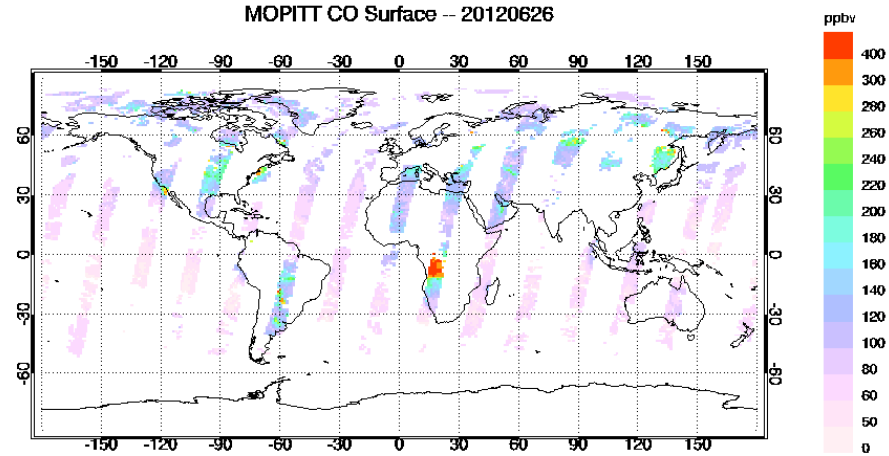
A **TIR/NIR** product, featuring the maximum sensitivity to near-surface CO. In this product, information from the NIR channels is exploited only in daytime observations over land. This product exhibits relatively large random errors and may require significant spatial and/or temporal averaging. *Example filename: MOP02J-20010101-L2V16.2.3.he5.*

MOPITT Product Images

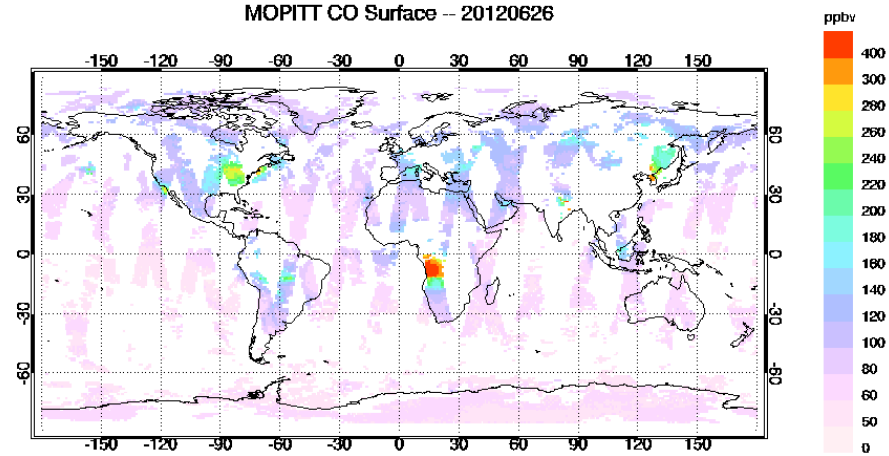
TIR/NIR
Daytime only



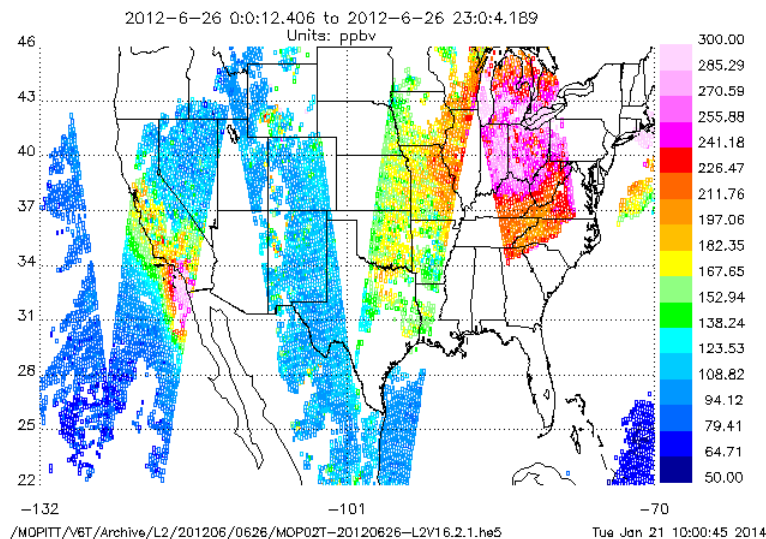
TIR-only
Daytime/Nighttime



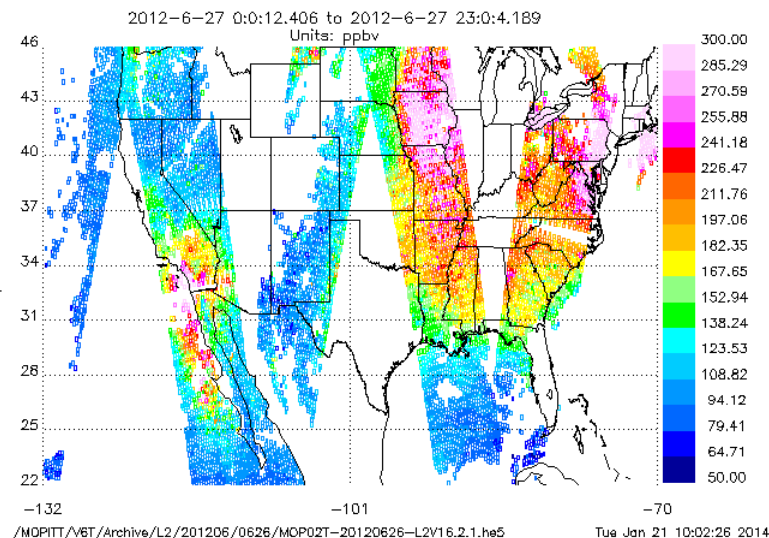
NIR-only
Daytime only



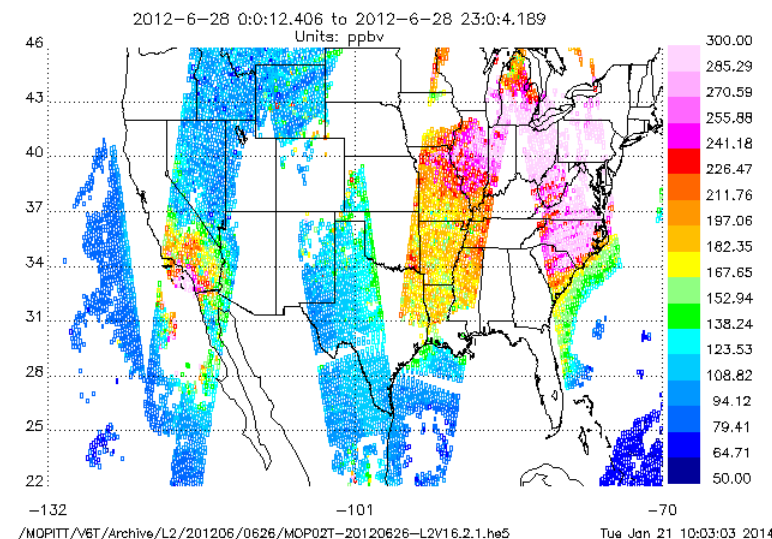
RetrievedCOSurfaceMixingRatio



RetrievedCOSurfaceMixingRatio



RetrievedCOSurfaceMixingRatio



Big MOPITT Limitation!! – COVERAGE

Due to large data gaps, do not expect to get daily coverage in your domain of interest!!

MOPITT Level 2, 3 Short names

Level 3	Level 2	Level 1	Level 0	Documentation
Level Description: Derived Carbon Monoxide profiles				
Products		Temporal Resolution	Spatial Resolution	Temporal Coverage
MOP02 (HDF) MOPITT Derived CO Level 2 Data		Observations every 0.4 seconds.	Swath	03/03/2000 - Present
MOP02J (HDF) MOPITT Derived CO (Near and Thermal Infrared Radiances)		Observations every 0.4 seconds.	Swath	03/03/2000 - Present
MOP02N (HDF) MOPITT Derived CO (Near Infrared Radiances)		Observations every 0.4 seconds.	Swath	03/03/2000 - Present
MOP02T (HDF) MOPITT Derived CO (Thermal Infrared Radiances)		Observations every 0.4 seconds.	Swath	03/03/2000 - Present



Level 3	Level 2	Level 1	Level 0	Documentation
Level Description: Carbon Monoxide gridded data. Daily averages and monthly means				
Products				
MOP03J (HDF) MOPITT CO gridded daily averages (Near and Thermal Infrared Radiances)				
MOP03N (HDF) MOPITT CO gridded daily averages (Near Infrared Radiances)				
MOP03T (HDF) MOPITT CO gridded daily averages (Thermal Infrared Radiances)				
MOP03JM (HDF) MOPITT CO gridded monthly means (Near and Thermal Infrared Radiances)				
MOP03NM (HDF) MOPITT CO gridded monthly means (Near Infrared Radiances)				
MOP03TM (HDF) MOPITT CO gridded monthly means (Thermal Infrared Radiances)				



File Names

AIRS

Level 3: AIRS.2013.03.07.L3.RetStd_IR001.v5.0.14.0.G13067153748.hdf

Date

Level

Product
Type

Version

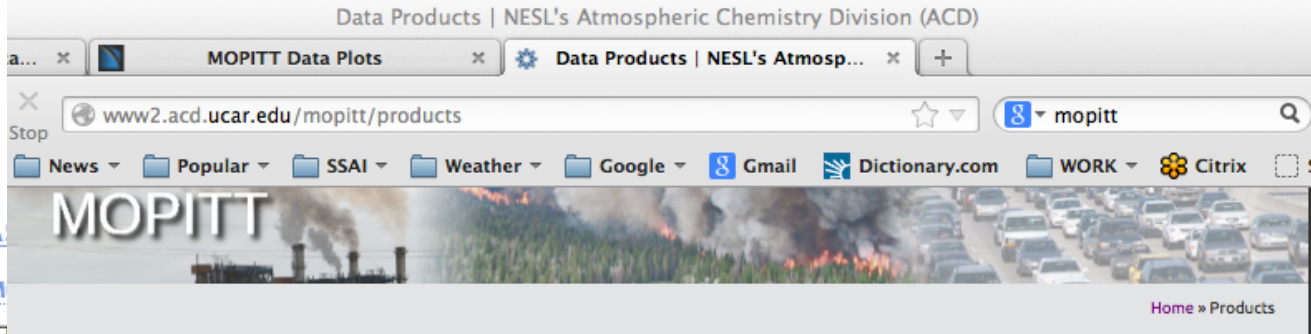
Level 2: AIRS.2009.12.03.131.L2.RetStd.v5.0.14.0.G2002123120634.hdf

Granule number = There are 240 granules/day

Short Name

Date

MOPITT L3: MOP03N-20020119-L3V3.1.2.hdf



MOPITT retrievals of carbon monoxide vertical profiles and total column are available for the period starting March 3, 2000 and continuing to the present. There is no operational MOPITT product for methane, due to a variety of problems with the methane-channel radiances. Some of these issues are documented in the 2005 paper "Effects of a spectral surface reflectance on measurements of backscattered solar radiation: Application to the MOPITT methane retrieval" by Pfister et al. (see [Publications](#)).

- **Version 6 (V6)** Level 2 and Level 3 products are now available for the entire MOPITT mission. Generally, V6 Level 2 and Level 3 products should become available between three weeks and two months after the actual observations; this data latency is the result of the dependency on the MERRA reanalysis. The same three retrieval variants are offered for V6 that were introduced for V5 (i.e., TIR-only, NIR-only, and TIR/NIR products). V6 products are provided in the HDF-EOS5 format, which can not be opened and read with software tools developed for HDF4 files (e.g., MOPITT V4 and V5 products). See the [V6 User's Guide \(updated Sept. 6, 2013\)](#) for more information. V6 products are not yet validated.

- **Version 5 (V5)** Level 2 and Level 3 products for CO vertical profiles and total column are available for the entire MOPITT mission (March, 2000 – present). Three Level 2 retrieval variants are offered for V5: A thermal infrared-only (TIR-only) product, similar to the V4 product; a new near infrared-only (NIR-only) product; and a new joint or multispectral TIR/NIR product. The V5 product is considered validated. V5 validation results are reported in a recent 2013 JGR paper by [Deeter et al.](#)

- **Version 4 (V4)** products for CO vertical profiles and total column were produced for observations between March, 2000 through December, 2012. The V4 product is considered 'validated.' V4 products are available for March, 2000 through December 31, 2012.
- **Version 3 (V3)** products for CO vertical profiles and total column were produced for observations between March, 2000 and July, 2009. V3 products are no longer publicly available.

- **Version 2 (V2)** products were produced only immediately after launch and are no longer publicly available.

MOPITT products are publicly available from NASA through the following links:

- NASA Data Archives via Reverb
- ASDC Data Pool
- ASDC MOPITT Subsetter (V5 Level 2 Products only)

- V4 TI

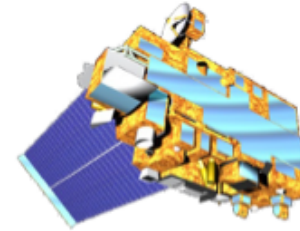
V6 User's Guide (updated Sept. 6, 2013)	A description of the V6 retrieval algorithm, Level 2 and Level 3 products; users of the V6 product may also need to consult the V4 and V5 User's Guides.
V6 L2 Data Quality Summary	Condensed discussion of the properties and limitations of the Version 6 Level 2 product.
V6 L3 Data Quality Summary	Condensed discussion of the properties and limitations of the Version 6 Level 3 product.



MEASUREMENTS OF POLLUTION IN THE TROPOSPHERE (MOPITT)

THE MOPITT MISSION

MOPITT is an instrument flying on NASA's Earth Observing System **Terra** spacecraft, measuring tropospheric carbon monoxide (CO) on the global scale. MOPITT measurements enable scientists to analyze the distribution, transport, sources and sinks of CO, a trace gas produced by methane oxidation, fossil fuel consumption and biomass burning. MOPITT has been operational since March 2000.



MOPITT PRODUCT AVAILABILITY

MOPITT Version 6 Level 2 and Level 3 products are now available for the entire MOPITT mission. Generally, V6 Level 2 and Level 3 products should become available between three weeks and two months after the actual observations; this data latency is the result of the dependency on the MERRA reanalysis. Version 4 and Version 5 Level 2 and Level 3 products are also available. See [Data Products](#) for descriptions of the different products. User's Guides available on the [Publications](#) page should be consulted before attempting to analyze the MOPITT products.

Uses Level 3 1x1 degree gridded data with downloadable KMZ for Google Earth

MOPITT PRODUCT VISUALIZATION

Global plots of MOPITT CO products at 1 degree horizontal resolution can be viewed for each day and month of the MOPITT mission.

V6 Plots

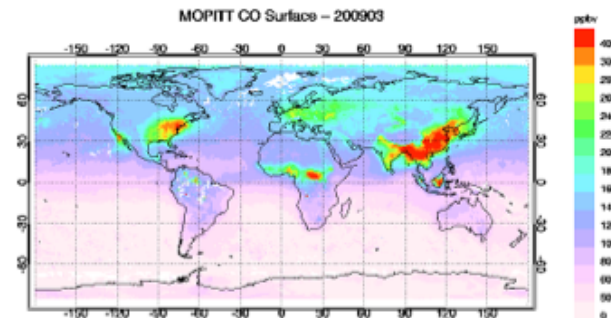
- V6 TIR-only [Daily Plots](#) / [Monthly Plots](#)
- V6 NIR-only [Daily Plots](#) / [Monthly Plots](#)
- V6 TIR/NIR [Daily Plots](#) / [Monthly Plots](#)

V5 Plots

- V5 TIR-only [Daily Plots](#) / [Monthly Plots](#)
- V5 NIR-only [Daily Plots](#) / [Monthly Plots](#)
- V5 TIR/NIR [Daily Plots](#) / [Monthly Plots](#)

V4 Plots

- V4 TIR-only [Daily Plots](#) / [Monthly Plots](#)



- Interactive Data Viewers for **V4**, **V5**, and **V6** MOPITT products



VISUALIZATION

QUICK-LOOK IMAGES

Global plots of MOPITT CO products at 1 degree horizontal resolution can be viewed for each day and month of the MOPITT mission. See the [News and Status page](#) for dates of, and reasons for, missing data.

V6 Plots

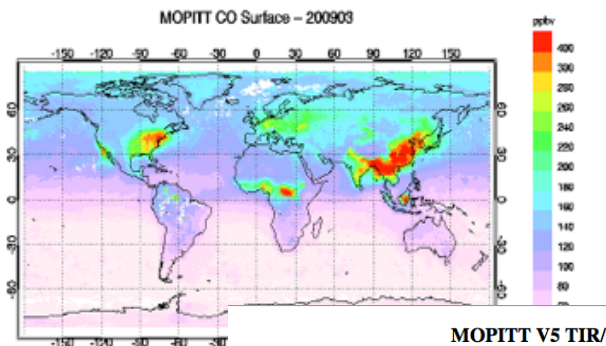
- V6 TIR-only [Daily Plots](#) / [Monthly Plots](#)
- V6 NIR-only [Daily Plots](#) / [Monthly Plots](#)
- V6 TIR/NIR [Daily Plots](#) / [Monthly Plots](#)

V5 Plots

- V5 TIR-only [Daily Plots](#) / [Monthly Plots](#)
- V5 NIR-only [Daily Plots](#) / [Monthly Plots](#)
- V5 TIR/NIR [Daily Plots](#) / [Monthly Plots](#)

V4 Plots

- V4 TIR-only [Daily Plots](#) / [Monthly Plots](#)



MOPITT V5 TIR/NIR Daytime CO Retrievals - Quick-look Images



[MOPITT Data page](#)
[Monthly Average Plots](#)

YEAR MONTH DAY LEVEL

2013 3 8

Column

[PLOT](#)
[PREVIOUS](#)
[NEXT](#)

MOPITT V5 TIR/NIR Daytime CO Retrievals - Quick-look Images



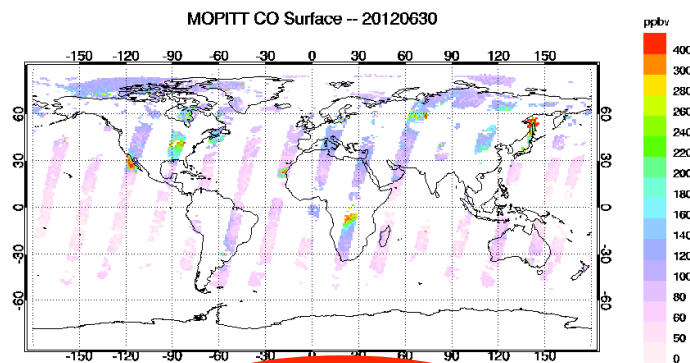
[MOPITT Data page](#)
[Monthly Average Plots](#)

YEAR MONTH DAY LEVEL

2012 6 30

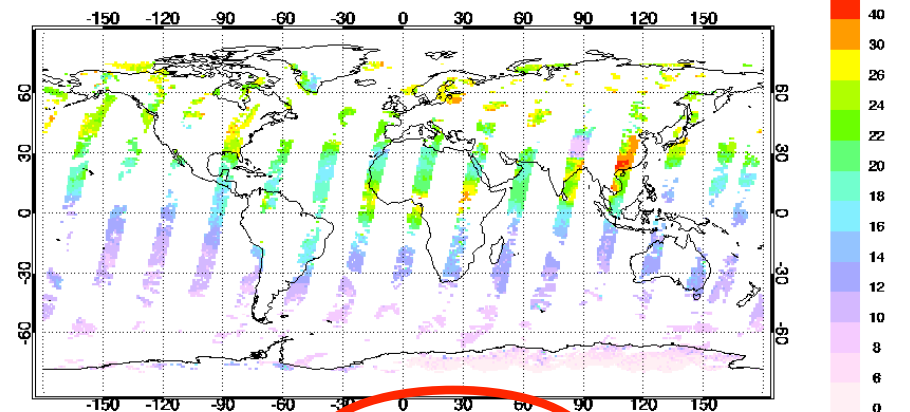
Surface

[PLOT](#)
[PREVIOUS](#)
[NEXT](#)



[MOPITT Google Earth File](#)

MOPITT CO Column -- 20130308



[MOPITT Google Earth File](#)



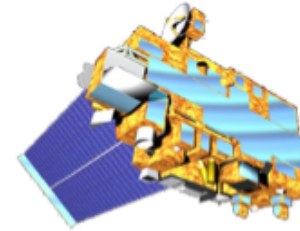
MOPITT now has an interactive visualizer

Homepage: <http://www.acd.ucar.edu/mopitt/>

MEASUREMENTS OF POLLUTION IN THE TROPOSPHERE (MOPITT)

THE MOPITT MISSION

MOPITT is an instrument flying on NASA's Earth Observing System **Terra** spacecraft, measuring tropospheric carbon monoxide (CO) on the global scale. MOPITT measurements enable scientists to analyze the distribution, transport, sources and sinks of CO, a trace gas produced by methane oxidation, fossil fuel consumption and biomass burning. MOPITT has been operational since March 2000.



MOPITT PRODUCT AVAILABILITY

MOPITT Version 6 Level 2 and Level 3 products are now available for the entire MOPITT mission. Generally, V6 Level 2 and Level 3 products should become available between three weeks and two months after the actual observations; this data latency is the result of the dependency on the MERRA reanalysis. Version 4 and Version 5 Level 2 and Level 3 products are also available. See [Data Products](#) for descriptions of the different products. User's Guides available on the [Publications](#) page should be consulted before attempting to analyze the MOPITT products.

- [NASA Data Archives via Reverb](#)
- [ASDC Data Pool](#)
- [ASDC MOPITT Subsetter \(V5 Level 2 Products only\)](#)

MOPITT PRODUCT VISUALIZATION

Global plots of MOPITT CO products at 1 degree horizontal resolution can be viewed for each day and month of the MOPITT mission.

V6 Plots

- V6 TIR-only [Daily Plots](#) / [Monthly Plots](#)
- V6 NIR-only [Daily Plots](#) / [Monthly Plots](#)
- V6 TIR/NIR [Daily Plots](#) / [Monthly Plots](#)

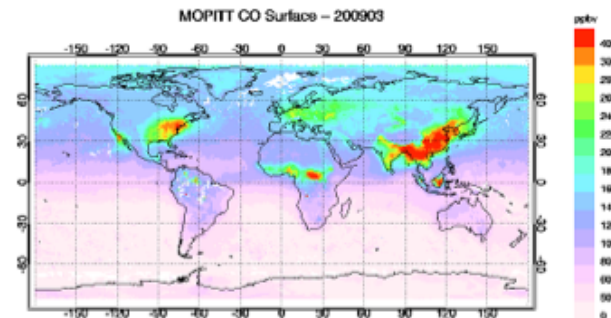
V5 Plots

- V5 TIR-only [Daily Plots](#) / [Monthly Plots](#)
- V5 NIR-only [Daily Plots](#) / [Monthly Plots](#)
- V5 TIR/NIR [Daily Plots](#) / [Monthly Plots](#)

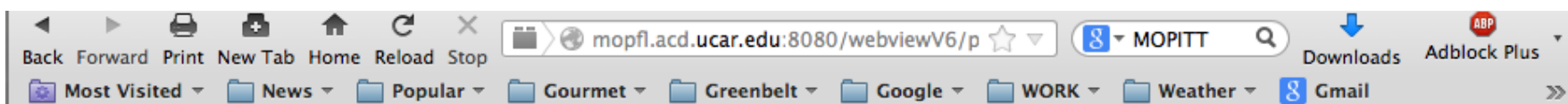
V4 Plots

- V4 TIR-only [Daily Plots](#) / [Monthly Plots](#)

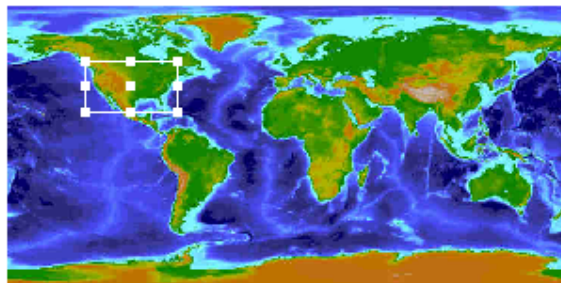
- [Interactive Data Viewers for V4, V5, and V6 MOPITT products](#)



MOPITT Interactive Data Viewer: <http://mopfl.acd.ucar.edu:8080/webviewV6/>



[Help](#)



55.0 N
130.0 W 72.0 W
22.0 N

Zoom In

Zoom Out

Current Files:

1. /MOPITT/V6T/Archive/L2/200006/0605/MOP02T-20000605-L2V16.2.1.he5
2. /MOPITT/V6T/Archive/L2/201306/0626/MOP02T-20130626-L2V16.2.1.he5

Select Level 2 variable to plot: RetrievedCOSurfaceMixingRatio

Projection

Cylindrical Equidistance

Colorbar

☐ Data Max to Min

☐ High - Low

☒ User Defined

Min: 50.00000 ppbv

Max: 300.000 ppbv

Plot Options

☐ Filled Pixels

☐ Black Background

☒ Political Boundaries

Size: Medium

Time

Year Month Day Hour Minute Second Millisecond

Start 2013 6 26 0 0 16 897

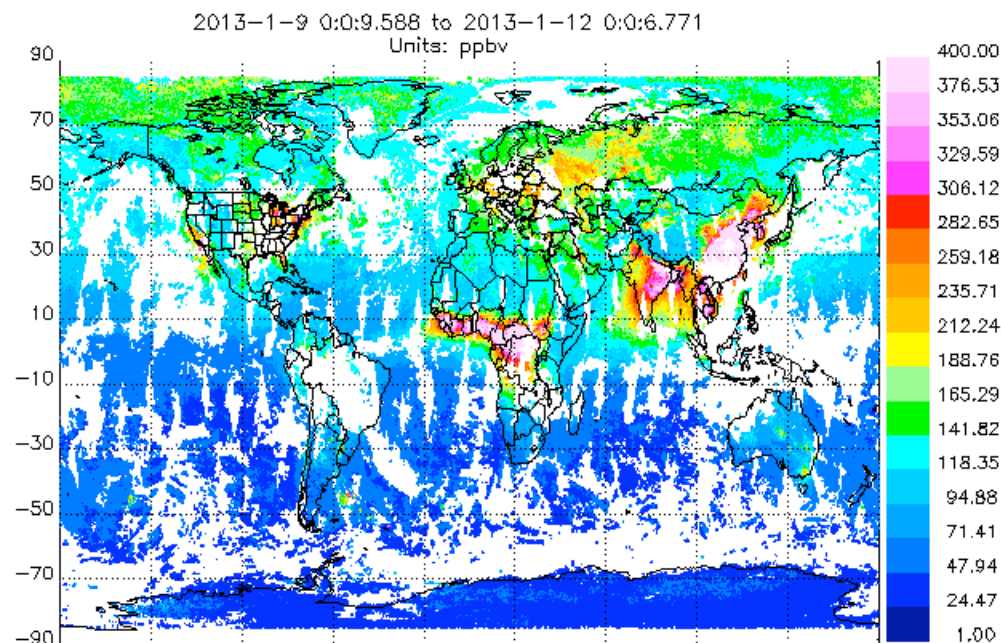
End 2012 6 26 23 59 59 672

Return to File Selection

Reset Form

Export ASCII File

Plot



Current Files:

1. /MOPITT/V6T/Archive/L2/201301/0109/MOP02T-20130109-L2V16.2.1.he5
2. /MOPITT/V6T/Archive/L2/201301/0110/MOP02T-20130110-L2V16.2.1.he5
3. /MOPITT/V6T/Archive/L2/201301/0111/MOP02T-20130111-L2V16.2.1.he5

Select Level 2 variable to plot: RetrievedCOSurfaceMixingRatio

Projection Cylindrical Equidistance	Colorbar <input type="radio"/> Data Max to Min <input type="radio"/> High - Low <input checked="" type="radio"/> User Defined Min: 1.00000 ppbv Max: 400.000 ppbv	Plot Options <input type="checkbox"/> Filled Pixels <input type="checkbox"/> Black Background <input checked="" type="checkbox"/> Political Boundaries Size: Medium
Time Year Month Day Hour Minute Second Millisecond Start 2013 1 9 0 0 9 588 End 2013 1 12 0 0 6 771		

Return to File Selection Reset Form Export ASCII File Plot

MOPITT Data Options

MOPITT Data Plots

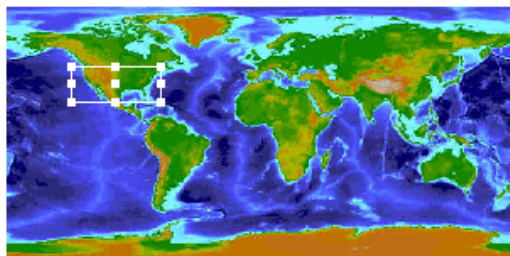
Back Forward Print New Tab Home Reload Stop

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47.0 N
134.0 W 70.0 W
22.0 N

Zoom In Zoom Out

Help

Mozilla Firefox

http://mopfl.ac...Export33988.txt

Back Forward Print New Tab Home Reload Stop

mopfl.ac

/MOPITT/V6T/Archive/L2/201206/0626/MOP02T-20120626-L2V16.2.1.he5

RetrievedCOTotalColumn

mol/cm2

6.1483491e+08

9488 Rows

0.0000000	22.6490	-78.7385	1.44293e+18
195.31700	34.5912	-83.1742	2.58548e+18
195.76700	34.5378	-83.7002	2.28244e+18
196.21700	34.4792	-84.2514	1.94735e+18
196.66700	34.4138	-84.8349	2.17334e+18
196.66700	34.1943	-84.7786	2.28690e+18
197.11700	34.4876	-84.5516	1.97743e+18
197.56700	34.6041	-83.9959	2.23721e+18
198.01700	34.7149	-83.4690	1.99838e+18
198.46700	34.8209	-82.9639	2.08610e+18
198.91700	34.9236	-82.4747	2.10626e+18
199.36700	35.0227	-81.9960	2.44906e+18
205.20100	35.6803	-79.9632	3.26988e+18
205.65100	35.6385	-80.4600	2.07351e+18
206.10100	35.5972	-80.9485	1.85808e+18
206.10100	35.3995	-80.9062	4.84476e+18
206.55100	35.5552	-81.4328	1.87937e+18
206.55100	35.3580	-81.3895	1.35081e+18
207.00100	35.5135	-81.9178	2.52359e+18
207.00100	35.3160	-81.8733	2.04869e+18
207.00100	35.1184	-81.8294	2.25329e+18
207.45100	35.4680	-82.4066	1.78810e+18
207.45100	35.2692	-82.3607	1.97663e+18
207.45100	35.0705	-82.3156	2.01648e+18
207.90100	35.4209	-82.9047	2.04342e+18
207.90100	35.2200	-82.8571	1.94698e+18
207.90100	35.0191	-82.8104	1.94628e+18

Current File: /MOPITT/V6T/Archive/L2/201206/0626/MOP02T-20120626-L2V16.2.1.he5

Select Level 2 variable to plot: RetrievedCOTotalColumn

Projection

Cylindrical Equidistance

Colorbar

- ☐ Data Max to Min
- ☐ High - Low
- ☒ User Defined

Min: 1.00000e+18 mol/cm2

Max: 3.00000e+18 mol/cm2

Plot Options

- ☐ Filled Pixels
- ☐ Black Background
- ☒ Political Boundaries

Size: Medium

Time

Year Month Day Hour Minute Second Millisecond

Start 2012 6 26 0 0 12 407

End 2012 6 26 23 59 44 19

Return to File Selection

Reset Form

Export ASCII File

Plot

MOPITT (+ all NASA EOS satellite) data are available at EOSDIS – NASA's Earth Observing System Data and Information System

Reverb | ECHO

reverb.echo.nasa.gov/reverb/#utf8=✓&spatial_map=satellite&spatial_type=rectangle

NASA National Aeronautics and Space Administration

EOSDIS NASA's Earth Observing System Data and Information System

Reverb | ECHO The Next Generation Earth Science Discovery Tool

EOSDIS Home | Reverb Home | About | Tutorial | Show Help | Shopping Cart (0) | Order Status | Service Request Status | Sign In

Search Options

- Spatial
- Search Terms
- Temporal
- Platforms & Instruments
- Campaigns
- Processing Levels
- Science Keywords

Save Query

Clear Criteria

Feedback? Tell us what you think.

Availability

ECHO Outage
2012-10-17 8:00AM (GMT-4:00) to 2012-10-17 12:00PM (GMT-4:00)
More

ASTER GDEM V2 Tutorial
2011-10-17 4:00AM (GMT-4:00) to (End Date Not Provided)
More

Notices

AMSR-E Instrument Failure
2011-10-04 8:58AM (GMT-4:00) to (End Date Not Provided)

Step 1: Select Search Criteria

Spatial Search

Bounding Box: e.g. -50.736, 163.477, -11.144, 105.680 (S,E,N,W) [Reset] [Clear]

Satellite

Click and drag to set a bounding rectangle

Imagery ©2012 NASA - Terms of Use

Search by ESRI shape file

Search Terms

e.g. MODIS Fire AST_L1A [Clear]

Temporal Search

START
YYYY-MM-DD HH:MM:SS [Clear]

END
YYYY-MM-DD HH:MM:SS [Clear]

* all times must be specified in GMT

Date Range Annual Repeating Dates

Step 2: Select Datasets

Found 2869 datasets. Total Query Time: 0.11s

<input type="checkbox"/>	15 MINUTE STREAM FLOW DATA: USGS (FIFE) Archive Center: ORNL DAAC Short Name: 15 MINUTE STREAM FLOW DATA: USGS (FIFE) Version: 0	[+]	[i]
<input type="checkbox"/>	2000 Pilot Environmental Sustainability Index (ESI) Archive Center: SEDAC Short Name: CIESIN_SEDAC_ESI_2000 Version: 1.0	[+]	[i]
<input type="checkbox"/>	2001 Environmental Sustainability Index (ESI) Archive Center: SEDAC Short Name: CIESIN_SEDAC_ESI_2001 Version: 2.0	[+]	[i]
<input type="checkbox"/>	2002 Environmental Sustainability Index (ESI) Archive Center: SEDAC Short Name: CIESIN_SEDAC_ESI_2002 Version: 3.0	[+]	[i]



Summary of Trace Gas Websites

GIOVANNI : <http://disc.sci.gsfc.nasa.gov/giovanni>

EOSDISC Reverb global search tool: <http://reverb.echo.nasa.gov>

GES-DISC: <http://disc.sci.gsfc.nasa.gov>

Mirador Archive: <http://mirador.gsfc.nasa.gov>

Worldview: <https://earthdata.nasa.gov/labs/worldview/>

Global Sulfur Dioxide Monitoring Homepage: <http://so2.gsfc.nasa.gov/>

Aura Homepage: <http://aura.gsfc.nasa.gov>

Aura Validation Data Center: <http://avdc.gsfc.nasa.gov>

OMSO2e Product: http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omso2e_v003.shtml

OMNO2d Product: http://disc.sci.gsfc.nasa.gov/Aura/data-holdings/OMI/omno2d_v003.shtml

MOPITT Homepage: <http://www2.acd.ucar.edu/mopitt/>

MOPITT Interactive Visualization tool:

<http://mopfl.acd.ucar.edu:8080/webviewV6/selectmopittfile>

